CONTENTS

RULES AND REGULATIONS FOR THE PROGRAMME

The Department of Computer Science is revising syllabi with effect from the academic year 2021-2022, 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

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 there to 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.

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.

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.

NUMBER OF CREDITS

The total credits for the course are 140. The credits for the different subjects are as follows:

Study Components	No. of courses	Credit per course	Total credits
PART- I Tamil / Other languages	2+2=4	3	12
PART- II English	2+2=4	3	12
PART- III Core Subject: Theory Practicals Elective Allied Subject: Theory Project: Mini Project	 11 6 2 2+2=4 1	 5/4/3 3 4 5 2	 47 18 8 20 2
PART – IV 1. (a) Not studied Tamil up to XII Std. –shall take Tamil comprising of two courses (level 6th Std.) (b) Studied Tamil up to XII Std.- taken non –Tamil under Part – I shall take Advanced Tamil comprising of two courses. (c) Others who do not come under (a & b) can choose non-Major Elective comprising of two courses. 2. Soft Skills 3. Environmental studies 4. Value Education	1+1=2 4 1 1	2 3 2 2	4 12 2 2
PART - V Extension Activities	1	1	1
TOTAL			**140**

Optional Extra Credits

1	Self-Study Course/Advanced Learner Course – Object Oriented Programming in C++	2 Extra Credits
2	Internship during the Summer Vacation after the completion of IV Semester	1 Extra Credit

INTERNSHIP GUIDELINES

Students are provided with an opportunity to do 14 days internship during the summer vacation after completion of the IV semester to get on the job training in diverse fields in IT sector. Students will get real time industry experience. It will enable the students to practically understand and diversify their learning experience in the subjects they have learnt in the course. Students must submit an internship report to the department in the beginning of the V semester along with the Internship certificate obtained from the company to receive 1 extra credit.

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.

PART I, II & III:

The maximum marks for CA are 40 and for End Semester examination is 60.The aggregate mark for each paper is 100.

PART IV:

The maximum marks for the End Semester examination are 50 and the passing minimum is 40% and there is no Continuous Assessment.

CLASSIFICATION OF SUCCESSFUL CANDIDATES

Part I, II, III & IV
Successful candidates passing the examination and securing the marks

(i) 60 % and above and

(ii) 50 % and above but below 60 % in the aggregate shall be declared to have passed the examination in the FIRST CLASS 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 and 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, Analyze and formulate novel ideas to yield, substantial results in the field of research utilizing the principle concepts of Programming languages combined with theoretical knowledge of Computer Science.

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

PO4: Cultivate unparallel 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.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-08
UNDERGRADUATE PROGRAMME PROFILE (2021-22 ONWARDS)
DEPARTMENT OF B.Sc. COMPUTER SCIENCE

COURSE CODES AND CREDITS

TOTAL MINIMUM CREDITS: 140 **TOTAL TEACHING HOURS: 180**

PART	CORE/ ALLIED/ ELECTIVE	TITLE OF THE PAPER	CODE	L	T	P	H	C	CA	SE	MM
I SEMESTER											
I	Language	Tamil/Hindi/French/Sanskrit					5	3	40	60	100
II	English	Communicative English					5	3	40	60	100
III	Core 1	C with Data Structures	CP21/1C/CDS	4	2	0	6	5	40	60	100
III	Practical I	C with Data Structures Lab	CP21/1C/PR1	0	0	4	4	3	40	60	100
III	Allied	Mathematics*					6	5	40	60	100
IV	EVS	Environmental Studies**					2	2	-	50	50
IV	Soft Skill	English Department-Professional English for Arts/Commerce/Physical Sciences/Life Sciences***					2	3	-	50	50
II SEMESTER											
I	Language	Tamil/Hindi/French/Sanskrit					5	3	40	60	100
II	English	Communicative English					5	3	40	60	100
III	Core 2	RDBMS using SQLite	CP21/2C/RDB	4	2	0	6	5	40	60	100
III	Practical II	RDBMS Lab	CP21/2C/PR2	0	0	4	4	3	40	60	100
III	Allied	Mathematics*					6	5	40	60	100
IV	Val. Ed.	Value Education**					2	2	-	50	50
IV	Soft Skill	English Department-Professional English for Arts/Commerce/Physical Sciences/Life Sciences***					2	3	-	50	50

III SEMESTER											
I	Language	Tamil/Hindi/French/Sanskrit					5	3	40	60	100
II	English	Communicative English					5	3	40	60	100
III	Core 3	Open-Source Software	CP21/3C/OSS	4	2	0	6	5	40	60	100
III	Practical III	Open-Source Software Lab	CP21/3C/PR3	0	0	4	4	3	40	60	100
III	Allied	Statistics	CP21/3A/STA	4	2	0	6	5	40	60	100
IV	NME(1c)	Front Office Management	CP21/3N/FOM	1	-	1	2	2	-	50	50
IV	Soft Skill	English Department-Professional English for Arts/Commerce/Physical Sciences/Life Sciences***					2	3	-	50	50
IV SEMESTER											
I	Language	Tamil/Hindi/French/Sanskrit					5	3	40	60	100
II	English	Communicative English					5	3	40	60	100
III	Core 4	Java Programming	CP21/4C/JAV	4	2	0	6	5	40	60	100
III	Practical IV	Java Programming Lab	CP21/4C/PR4	0	0	4	4	3	40	60	100
III	Allied	Resource Management Techniques	CP21/4A/RMT	4	2	0	6	5	40	60	100
IV	NME(1c)	Web Technology	CP21/4N/WBT	1	-	1	2	2	-	50	50
IV	Soft Skill	English Department-Professional English for Arts/Commerce/Physical Sciences/Life Sciences***					2	3	-	50	50
V SEMESTER											
III	Core 5	ASP.Net	CP21/5C/ASP	3	2	-	5	4	40	60	100
III	Core 6	Software Engineering	CP21/5C/SOE	3	2	-	5	4	40	60	100
III	Core 7	Computer Architecture	CP21/5C/CAR	3	2	-	5	4	40	60	100
III	Core 8	Operating Systems	CP21/5C/OPS	3	2	-	5	4	40	60	100
III	Practical V	ASP.Net Lab	CP21/5C/PR5	0	0	4	4	3	40	60	100
III	Elective I	Data Mining and Data Ware Housing	CP21/5E/DMW	4	2	-	6	4	40	60	100
		Artificial Intelligence	CP21/5E/ARI	4	2	-	6	4	40	60	100
		Cloud Computing	CP21/5E/CCP	4	2	-	6	4	40	60	100

VI SEMESTER											
III	Core 9	Unix and Shell Programming	CP21/6C/USP	3	2	-	5	4	40	60	100
III	Core 10	Data Communication Networking	CP21/6C/DCN	3	2	-	5	3	40	60	100
III	Core 11	R Programming with Data Science	CP21/6C/RDS	3	2	-	5	4	40	60	100
III	Practical VI	Unix & R Programming Lab	CP21/6C/PR6	-	-	4	4	3	40	60	100
III	Elective II	Internet of Things	CP21/6E/IOT	3	2	-	5	4	40	60	100
		Machine Learning	CP21/6E/MAL	3	2	-	5	4	40	60	100
		Security Management	CP21/6E/SEM	3	2	-	5	4	40	60	100
III	Project	Mini Project	CP21/6C/MNP	-	-	6	6	2	40	60	100
V		Extension Activity(Sports/NCC/NSS/CSS/YRC/ RRC/Retract/Yoga)		Min 60 hours				1	-	-	-
				Total Credits				140			
		OPTIONAL EXTRA CREDITS									
III	Self-Study Semester V										
		Object Oriented Programming in C++	CP21/5SS/CPP	-				2	-	100	100
III	Internship – End of Semester IV		CP21/4SS/INT					1	-	100	100

L= Lecture Hours

T=Tutorial Hours

P=Practical Hours

H=Hours per week

C=Credits

CA=Continuous Assessment

SE=Semester Examinations

MM=Maximum Marks

***Handled by Department of Mathematics**

****Common to all the UG Programs**

*****Handled by Department of English**

EVALUATION PATTERN FOR CONTINUOUS ASSESSMENT-UG

INTERNAL VALUATION BY COURSE TEACHERS

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**

Internship is done for a minimum period of 14 days with a certificate and document submission for Viva-Voce. Internship Viva Voce will be conducted by the Guide to inspect the work done by the student.

CA QUESTION PAPER PATTERN-UG FIRST YEAR

Knowledge Level	Section	Word Limit	Marks	Total	Time
K 1	**A-3 x 2 marks**	**50**	**6**	**50**	**2 Hrs**
K1, K 2	**B-3/4 x8 marks**	**200**	**24**		
K2, K 3	**C-1/2 x20 marks**	**500**	**20**		

CA QUESTION PAPER PATTERN-UG SECOND YEAR & THIRD YEAR

Knowledge Level	Section	Word Limit	Marks	Total	Time
K 1	**A-3 x 2 marks**	**50**	**6**	**50**	**2 Hrs**
K1, K 2	**B-3/4 x8 marks**	**200**	**24**		
K2, K 3	**C-2/3 x10 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

PART I, II, III –THEORY& ELECTIVE PAPERS (Semester I/II/III/IV/V/VI)

Time : 3 hours
Maximum Marks : 100[To be converted to 60 marks]
Passing Mark : 40

Double evaluation by Course Teacher and External Examiner.

PART III - PRACTICAL PAPERS (Semester I/II/III/IV/V/VI)

Time : 3 hours
Maximum Marks : 60
Passing Mark : 40

Double evaluation by Course Teacher and External Examiner. Practical question paper will be framed by the External Examiner from the practical question bank kept in the Department.

PART IV- PRACTICAL ORIENTED SKILL BASED NME

Time : 2 hours
Maximum Marks : 50
Passing Mark : 20
The Practical question paper will be framed by the course teacher/faculty and single evaluation will be followed.

MINI PROJECT VIVA-VOCE

Maximum Marks : 60
Implementation of the Software application developed along with Documentation will be submitted for Viva-Voce.

END SEMESTER QUESTION PAPER PATTERN: -THEORY PAPERS
UG FIRST YEAR

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special Instructions if any
K1	A-10 x 2	50	20	100	3Hrs	Two questions from each unit
K1,K2	B-5/8 x 8	200	40			Atleast one question from each unit
K2,K3	C-2/3 x 20	500	40			Compulsory one question from each unit

END SEMESTER QUESTION PAPER PATTERN: -THEORY PAPERS
UG SECOND & THIRD YEAR

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special Instructions if any
K1	A-10 x 2	50	20	100	3Hrs	Two questions from each unit
K1,K2	B-5/8 x 8	200	40			Atleast one question from each unit
K2,K3	C-4/6 x 10	500	40			Compulsory one question from each unit

SEMESTER I COURSE PROFILE-PROGRAMME OF STUDY

SEMESTER I								
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
CP21/1C/CDS	C with Data Structures	5	6	90	4-2-0	40	60	100
	Allied – Mathematics	5	6	90		40	60	100
CP21/1C/PR1	Practical I – C with Data Structures Lab	3	4	60	0-0-4	40	60	100
	Environmental Studies	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

C WITH DATA STRUCTURES

Total Hours: 90 **COURSE CODE: CP21/1C/CDS**

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

COURSE OBJECTIVES:

To enable students

1. Obtain Knowledge about the Structure of the Programming Language C.
2. Understand and implement the concepts of different data structures using C.
3. Design and develop programs using various data structures.
4. Choose appropriate data structures needed for various applications.
5. Develop programming and logical thinking skills.

COURSE OUTLINE:

UNIT I:

Importance and Basic Structure of C Programs – Character set – C Tokens – Keywords and Identifiers – Constants – Variables – Data Types –Defining Symbolic constants – Operators and Expressions – Managing Input and Output Operations – Decision Making and Branching – ELSE IF, Nesting of IF... ELSE, Switch. Decision Making and Looping – WHILE, DO, FOR, Jumps in Loops.

UNIT II:

Programming Tools – Algorithm – Definition – Characteristics – Flow Chart – Definition – symbols. Arrays – One Dimensional Arrays – Declaration, Initialization – Two Dimensional Arrays – Initialization. Reading, Writing Strings – String handling functions – User defined functions-Elements of User defined functions – Category of Functions – Recursion.

UNIT III:

Structures – Defining a Structure – Declaring Structure Variables – Accessing Structure members – Structure Initialization – Unions. Pointers – Introduction – Accessing the Address of a Variable – Declaring and initializing Pointer Variables – Accessing Variables through its Pointer.

UNIT IV:

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

UNIT V:

Linked list – Introduction – Operations – Insertion, Deletion. Stacks and Queue – Introduction – Linked representation of Stack and Queues – Evaluation of Expressions. Trees – Binary Trees – Binary Tree representation and traversals.

RECOMMENDED TEXTBOOKS:

1. E. Balagurusamy, Programming in ANSI C, 8th edition, Tata McGraw Hill Publications,2019.
2. Seymour Lipschutz, Data Structures with C (Schaum's Outline Series), Revised 3rd edition, Tata McGraw Hill Publications, 2017.

REFERENCE BOOKS:

1. Yashavant Kanetkar, Let us C: Authentic Guide to C Programming Language, 17th Edition, BPB Publications,2020.
2. P. Padmanabham, C & Data Structures, Third Edition, BS Publications, 2019.
3. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, Data Structures Using C, First Edition, Pearson Education, 2019.
4. Herbert Schildt, C: The Complete Reference, Fourth Edition, Tata McGraw Hill, 2017.
5. Reema Thareja ,Introduction to C programming, 2nd Edition, Oxford Press,2015.

JOURNALS:

1. International Journal of Innovative Research in Technology
2. International Journal of Computer Science and Programming Language
3. International Journal of Data Structures
4. Indian Journal of Science and Technology
5. International Journal of Science and Research

E-LEARNING RESOURCES:

1. https://fresh2refresh.com/c-programming/c-basic-program/
2. https://www.tutorialcup.com/cprogramming/decision-making-and-loops.html
3. https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues
4. http://www.c4learn.com/data-structure/stack-operations
5. https://stacktips.com/tutorials/c/sorting-methods-in-data-structures

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Explain various loops and decision-making statements to solve the problem.
CO 2	To apply different operations on arrays and use functions concepts to solve the given problem.
CO 3	Use of pointers, structures and unions.
CO 4	Discuss various array operations, sorting and searching techniques in formulating new solutions to solve the real-world problems.
CO 5	Demonstrate the application of stack, queue operations and its implementation in multi domain 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	2	3	3	3
CO2	3	3	3	3	3	2
CO3	3	3	3	2	3	2
CO4	3	3	3	3	3	3
CO5	3	3	2	3	2	2
AVERAGE	3	3	2.6	2.8	2.8	2.4

KEY: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-LCD), Seminar,

Problem Solving, Group Discussion, Role Modelling

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 WITH DATA STRUCTURES LAB

Total Hours:60 **COURSE CODE: CP21/1C/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 find the given number is odd or even using if… else statement.
2. Write a C program to perform basic arithmetic operations using switch...case statement.
3. Write a C program to find the sum of natural numbers using while loop.
4. Write a C program to find the sum of digits of a given number using do…while loop.
5. Write a C program to find the factorial of a given number using for loop.
6. Write a C program to perform the following Operation Addition, Subtraction, Multiplication and Transpose in Matrix.
7. Write a C program to perform String Operations using String Functions.
8. Write a C program to generate Fibonacci Series using Recursive Function.
9. Write a C program to swap two numbers using pointers.
10. Write a C program to implement Bubble Sort using Functions
11. Write a C program to implement Merge Sort using Arrays
12. Write a C program to implement Linear Search using Functions.
13. Write a C program to Search an element in the Array using Binary Search.
14. Write a C program to implement Stack using Pointers.
15. Write a C program to implement Queue using Pointers.
16. Write a C program for Inorder, Preorder and Postorder Binary Tree Traversal.

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Apply the basic fundamentals of Decision making and looping concepts of C programming.
CO 2	Learning Array operations and concepts of Functions.
CO 3	To apply the concept of Pointers.
CO 4	Implementing various sort and search techniques.
CO 5	Applying the concept of Stack and Queue.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	2	2	3
CO2	3	3	2	3	3	2
CO3	3	3	2	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	2	2	3
AVERAGE	3	3	2	2.6	2.6	2.4

KEY: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O CORELATION-0

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

SEMESTER II COURSE PROFILE-PROGRAMME OF STUDY

SEMESTER II								
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
CP21/2C/RDB	RDBMS Using SQLite	5	6	90	4-2-0	40	60	100
	Allied – Mathematics	5	6	90		40	60	100
CP21/2C/PR2	Practical II – RDBMS Lab	3	4	60	0-0-4	40	60	100
	Value Education	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

RDBMS Using SQLite

Total Hours: 90 **COURSE CODE: CP21/2C/RDB**

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 describe the fundamental elements of relational database management systems.
3. To design simple database models using Entity-Relationship Modelling and Normalize it.
4. To learn and understand SQL, PL/SQL.
5. To improve the database design by normalization.
6. To provide better backup and recovery procedures.
7. Understand database concepts and structures and query language.

COURSE OUTLINE:

UNIT I:

Introduction To Database Management System: What Is Database System - Purpose of Database System – View of Data – Database Engine. Introduction To Relation Model: Introduction – Structure of Relational Databases – Database Schema – Keys - Relational Query Languages – The Relational Algebra.

UNIT II:

Database design Using ER Model: Overview - ER-Model – Complex Attributes– Mapping Cardinalities – Primary Key – Removing Redundant Attributes in Entity Sets - Extended E-R Features. Complex Data Types: Semi Structured Data – Textual Data – Spatial Data.

UNIT III:

Normalization of Database Tables: Database tables and Normalization – The Need for Normalization –The Normalization Process – High level Normal Form. Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Table.

UNIT IV:

Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS.SQL JOIN Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function.

UNIT V:

PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

RECOMMENDED TEXTBOOKS:

1. A Silberschatz, H Korth, S Sudarshan, Database System and Concepts, Seventh Edition McGraw-Hill, March 2019.
2. Rob, Coronel, Database Systems, Nineth Edition.
3. Nilesh Shah, Database Systems Using Oracle, 2nd edition, Pearson Education India, 2016.

REFERENCE BOOKS:

1. Gerardus Blokdyk, SQLite Complete Self-Assessment Guide, 5StarCooks, 2018.
2. Arjun Majumdar & Pritimoy Bhattacharya, Database Management Systems,TMH, 2017.
3. Jan L. Harrington, Relational Database Design and Implementation, 4th Edition, Morgan Kaufmann, 2016.

JOURNALS:

1. International Journal of Database Management Systems.
2. International Journal of Trend in Scientific Research and Development.

E-LEARNING SOURCES:

1. https://www.sqlite.org/whentouse.html
2. https://www.sqlitetutorial.net
3. https://eu.udacity.com/course
4. http://www.sql-tutorial.ru
5. https://beginnersbook.com/2015/04/rdbms-concepts
6. Unit III: (Functional Dependencies and Normal Form)http://nptel.iitm.ac.in

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	Declare and Enforce integrity constraints on a database using a state of the art of RDBMS.
CO 5	Design ER-models to represent simple database application scenarios.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	0	1	0	0
CO2	3	0	2	0	1	0
CO3	2	1	3	3	0	0
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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2**W**EAKLY CORELATED-1 **N**O 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 Instruction if any
K1	**A – 10 x 2 marks**	**50**	**20**	**100**	Two questions from each unit.
K1, K2	**B – 5/8 x 8 marks**	**200**	**40**		At least one question from each unit.
K2, K3	**C – 2/3 x 20 marks**	**500**	**40**		Compulsory one question from each unit.

SEMESTER II

PRACTICAL II – RDBMS LAB

Total Hours: 60 **Course Code: CP21/2C/PR2**

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

COURSE OBJECTIVES:

To enable students to

1. Be familiar about the basic concepts of database.
2. To give a good formal foundation on the relational model of data.
3. To improve the database design by normalization.
4. To present the concepts and techniques relating to query processing by SQL engines.

PRACTICAL LIST

1. Write a SQL Statements using DDL to create table with Constraints and insert 10 records.
2. Write a SQL program to implement DML statement.
3. Write a SQL program using Nested queries and Join Operation with two tables.
4. Write a SQL program using SET operation.
5. Write a SQL program using Date and Time Function, Numeric Function, String Function and Conversion Function.
6. 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.
7. Write a PL/SQL program using FOR loop.
8. Write a PL/SQL block to check the result status of students.
9. Write a program to manage triggers in the SQLite database.
10. Create and manage the Employee Payroll information system with necessary tables and generate appropriate reports based on conditions.

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Understanding the basic term, syntax with relational database design modulus.
CO 2	Able to apply the concept of SQL queries.
CO 3	Able to Normalize the database.

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O CORELATION-0

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

SEMESTER III COURSE PROFILE-PROGRAMME OF STUDY

SEMESTER III								
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
CP21/3C/OSS	Open-Source Software	5	6	90	4-2-0	40	60	100
CP21/3A/STA	Allied-Statistics	5	6	90	4-2-0	40	60	100
CP21/3C/PR3	Practical III -Open-Source Software Lab	3	4	60	0-0-4	40	60	100
CP21/3N/FOM	NME- Front Office Management	2	2	30	1-0-1		50	50
	Soft Skills	3	2	30			50	50

Credits gained during Semester III: 24

SEMESTER III

OPEN-SOURCE SOFTWARE

Total Hours: 90 **COURSE CODE: CP21/3C/OSS**

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

COURSE OBJECTIVES:

To enable students

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

COURSE OUTLINE:

UNIT I:

Basics of Python Programming: Features of Python, History of Python, Python Interpreter and Interactive Mode, Values and Types-Numbers-Boolean-Lists-Strings-variables and Identifiers-Data Types-Statements: Assignment Statement-Input Statement-Indentation. Reserved Words-Tuple Statement- Dictionary- Operators and Expressions: Arithmetic Operators-Comparison Operators-Assignment and In-place or Shortcut Operators-Unary Operators-Bitwise Operators-Shift Operators-Logical Operators-Membership Operators-Identity Operators- Operators Precedence and Associativity. Expression in Python- Operations on Strings: Concatenation-Multiplication(or String Repetition)-Slice a String. Type of Conversion-Comments-Function and Modules: Function Definition and Use-Flow of Execution-Parameters and Arguments.

Control Flow Statements: Introduction to Decision Control Statements-Selection/Conditional Branching Statements: if Statement-if-else Statement-Nested if Statements-if-elseif-else Statement. Basic Loop Structures/Iterative Statements: while loop-for loop-Selecting an appropriate loop. Nested Loops-The break Statement-The continue Statement-The pass Statement-The else Statement Used with Loops. Functions: Introduction: Need for Functions. Defining a Function-Function Call: Function Parameters, Variable Scope and Lifetime: Local and Global Variables-Using the Global Statement-Resolution of Names-Fruitful Functions: The return Statement-Parameters. Function Composition in Python-Recursive Functions: Greatest Common Divisor-Finding Exponents-The Fibonacci Series-Recursion vs Iteration.

UNIT II:

Strings: Concatenating, Appending, and Multiplying Strings-Strings are Immutable-String Formatting Operator-Built-in String Methods and Functions-Slice Operation: Specifying Stride While Slicing Strings- ord() and chr() Functions-in and not in operators-Comparing Strings-Iterating String. The String Module-List, Tuples and Dictionaries: Sequence-Lists: Access Values in Lists-Updating Values in Lists-Nested Lists-Aliasing-Cloning Lists-List Parameters-Basic List Operations-List Methods-Lists as Arrays-Advanced List Processing-Looping in Lists. Functional Programming: filter() Function-map() Function-reduce() Function. Tuple: Creating Tuple-Utility of Tuples-Accessing Values in a Tuple-Updating Tuple-Deleting Elements in Tuple-Basic Tuple Operations-Tuple Assignment-Tuples for Returning Multiple Values-Nested Tuples- Checking the index: index()Method-Counting the Elements: count()Method-List Comprehension and Tuples-Variable length Argument Tuples-the zip() Function-Advantages of Tuples over List.

UNIT III:

Dictionaries: Creating a Dictionary-Accessing Values-Adding and Modifying an item in a Dictionary-Modifying an Entry-Deleting Items-Sorting Items in a Dictionary-Looping over a Dictionary-Nested Dictionaries-Built in Dictionary Functions and Methods-Difference between a List and a Dictionary-String Formatting with Dictionaries List vs Tuples vs Dictionary vs Set. File Handling: Introduction-File Path-Types of Files: ASCII Text Files-Binary Files. Opening and Closing Files: The open() Function-The File Object Attributes-The close() Method. Reading and Writing Files: write() and writelines() Method-append() Method-The read() and readline() Method-Opening Files using with Keyword-Splitting Words-Some Other Useful File Methods-File Positions-Command Line Arguments-Renaming and Deleting Files.

Error and Exception Handling: Introduction to Errors and Exceptions: Syntax Errors, Logic Error, Exceptions. Handling Exceptions-Multiple Except Blocks-Multiple Exceptions in a Single Block-Except Block Without Exception-The else clause-Raising Exceptions-Instantiating Exceptions-Handling Exceptions in Invoked Functions-Built-in and User-Defined Exceptions-The try..finally Block

UNIT IV:

Introduction: History – Features –Basic development concepts – Creating first PHP script– Mixing PHP with HTML. Using variables and operators: Variables – Data types – Constants –Manipulating variables with operators-Validating User input. Controlling Program Flow: Simple and complex conditional statements – loops – String and numeric functions. Working with arrays: Storing data in arrays -Processing with loops and iterators – Using arrays with forms, array functions, date and time.

UNIT V:

Functions and classes: User defined functions – creating classes. Files and directories: Reading and writing files – File and processing directories – Performing with directory operations.

Introduction to databases – Addition or modifying data – Handling errors: Script errors – Using exceptions – Logging errors and debugging errors.

RECOMMENDED TEXT BOOKS:

1. Reema Thareja, Problem Solving and Programming with Python, Oxford University Press, 2019.
2. Allen Downey, Think Python, Shroff Publishers & Distributors Pvt. Ltd, 2016.
3. Martin C Brown, Python: The Complete Reference, TMH, 2018.
4. Y. Daniel Liang, Introduction to Programming using Python, Pearson,2018.
5. Vikram Vaswani, PHP- a beginner's guide, TMH Education Pvt. Ltd.

REFERENCE BOOKS:

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2017.
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010.
3. RydhmBeri, Python Made Simple, BPB, 2019.
4. Sheetal Taneja, Naveen Kumar, Python programming A Modular Approach, Pearson, 2018.

JOURNALS:

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

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://realpython.com/python-lists-tuples
6. UNIT II: (List-NPTEL)https://www.youtube.com/watch?v=jMShssechMI
7. UNIT II: (Tuples-NPTEL) https://www.youtube.com/watch?v=KrPifJU8k7U

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Outline on the basics of Python programming to design, code, and test small Python programs using functions.
CO 2	Develop programs using conditions and loops in Python. Using List data structure.
CO 3	Develop web applications using arrays with conditions and looping structures.
CO 4	Develop simple scripts with files and directories.
CO 5	Handling errors and develop script for table.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	3	1	2	2	-
CO2	1	3	1	2	2	-
CO3	1	3	1	3	2	-
CO4	3	3	1	2	2	-
CO5	2	2	1	1	3	2
AVERAGE	1.6	3.4	1	2	2.2	0.4

KEY: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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**		At least one question from each unit
K2, K 3	**C-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SEMESTER III

ALLIED-STATISTICS

Total Hours:90 **COURSE CODE:CP21/3A/STA**

CREDITS:5 **L-T-P: 4-2- 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) – Bayes' 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, 8th edition,2019.
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, 3rd Revised Edition, 2018.
2. Dr.A.Singaravelu, Allied Mathematics, ARS Publications, 2018.
3. Kandasamy, K. Thilagavathy, Gunavathy K, Numerical Methods, S CHAND & Co, 2015.
4. Ken Black- Applied Business Statistics, 7thEdition,Wiley.
5. Probability and Statistics, Murray Spiegel, John Schiller, R.Alu Srinivasan, Debasree Goswami, TMH, 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 analyse 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:**S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2**W**EAKLY CORELATED-1 **N**O 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**		At least one question from each unit
K2, K 3	**C-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SEMESTER III

PRACTICAL III – OPEN-SOURCE SOFTWARE LAB

Teaching Hours: 60 **COURSE CODE: CP21/3C/PR3**

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

COURSE OBJECTIVES:

To enable students to

1. To become familiar with the usage of functions and arguments in python.
2. To learn the concepts of looping techniques in python
3. To implement the web page creation and apply the manipulations
4. To design and display in report format

PRACTICAL LIST:

PYTHON

1. Implementing functions
    a. without arguments using python.
    b. with arguments using python
    c. recursion using python
2. Implementing operators
3. Implementing conditional statements
4. Implementing string operations using python
5. Implementing loop concepts using python
6. Implementing list operations using python

PHP

1. Creation of static web page for an advertisement.
2. Creation of a web form and apply all the controls in it.
3. Creation of a Custom based application with necessary tables and generate reports.
    a) Include more than two tables.
    b) Include integrity rules.
    c) Generate reports based on given conditions.

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Develop simple programs in python
CO 2	Develop programs using conditions and loops in Python.
CO 3	Develop simple web applications
CO 4	Handling table and perform manipulations
CO 5	Creation of report

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	3	1	2	2	-
CO2	1	3	1	2	2	-
CO3	1	3	1	3	2	-
CO4	3	3	1	2	2	-
CO5	2	2	1	1	3	2
AVERAGE	1.6	3.4	1	2	2.2	0.4

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 III

FRONT OFFICE MANAGEMENT

Total Hours:30 **COURSE CODE:CP21/3N/FOM**

CREDITS :2 **L T P: 1-0-1**

COURSE OUTLINE:

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. Herbert L Tyson, Herb Tyson, Microsoft Word 2010: Bible, Wiley,2010.
2. Eric Wells, Microsoft Excel 97 Developer's Hand Book.

REFERENCE BOOKS:

1. Joan Lambert, Microsoft office word 2019 step by step, Microsoft Press.
2. Linda Foulkes, Learn Microsoft office 2019, Packt Publishers, 2020.

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O CORELATION-0

Practical paper questions will be framed by the course teacher.

SEMESTER IV COURSE PROFILE-PROGRAMME OF STUDY

SEMESTER IV								
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
CP21/4C/JAV	Java Programming	5	6	90	4-2-0	40	60	100
CP21/4A/RMT	Allied-Resource Management Techniques	5	6	90	4-2-0	40	60	100
CP21/4C/PR4	Practical IV-Java Lab	3	4	60	0-0-4	40	60	100
CP21/4N/WBT	NME- Web Technology	2	2	30	1-0-1		50	50
	Soft Skills	3	2	30			50	50

Credits gained during Semester IV: 24

SEMESTER IV

JAVA PROGRAMMING

Total Hours: 90 **COURSE CODE: CP21/4C/JAV**

CREDITS: 5 **LTP:4-2-0**

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-Changing the case of characters within a string – Joining Strings, Additional string methods – String Buffer: Methods and Constructors.

UNIT V:

The Applet Class: Applet Basic – An Applet Skeleton – Simple Applet Display Methods-Using the Status Window-The HTML Applet Tag – Event Handling: The Delegation Event Model – Event Classes – The Key Event Class – Event Listener Interfaces – Using the Delegation Event Model – 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 – Using AWT controls, Layout Managers: Flow Layout, Border Layout, Grid Layout, Card Layout – Menu Bars and Menus. Database Programming using JDBC: Introduction to JDBC, Steps to connect to the database, JDBC Drivers & Architecture, Types of JDBC Drivers, Connectivity with Oracle, Connectivity with MySQL.

RECOMMENDED TEXTBOOKS:

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

REFERENCEBOOKS:

1. K.Arnold, J.Gosling and David Holmes, The Java Programming Language, 4thEdition, Addison-Wesley Press.
2. Cay S. Horstmann, Gary Cornell, Core Java2VolumeI–Fundamentals, 7th Edition, Prentice-Hall.
3. Paul Deitel and Harvey Deitel, Java–How to program, 11th Edition, Pearson, 2017.
4. E. Balaguruswamy, Programming with JAVA-A Primer, 5th Edition, McGraw Hill, 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-LEARNINGSOURCES:

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 Number	CO Statement
CO1	Write, compile and execute Java programs that may include basic data types and Control flow constructs.
CO2	Learn the concept of oops principles and its usage.
CO3	To understand importance of Multi-threading & different exception handling mechanisms.
CO4	To learn the concepts of handling String and String Buffer functions.
CO5	To learn experience of designing, implementing, testing and debugging graphical user interfaces in Java using applet with JDBC Connectivity.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1**N**O CORELATION-0

TEACHING METHODOLOGY:

Lecture(Chalk and Talk-OHP-LCD)

Flipped Learning/Blended Classroom-E Content, Videos-

Problem Solving-Group Discussion-Role Modeling-

Seminar- Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K1	**A-10X2marks**	**50**	**20**	**100**	Two questions from Each Unit
K1.K2	**B-5/8x8marks**	**200**	**40**		Atleast one question From each unit
K2,K3	**C-4/6x10marks**	**500**	**40**		Compulsory One Question from each unit

SEMESTER IV

ALLIED-RESOURCE MANAGEMENT TECHNIQUES

Total Hours: 90 **COURSE CODE: CP21/4A/RMT**

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

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 analyze 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 – 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 n jobs through 3 machines –Processing n jobs through m machines. Characteristics of game theory-Minimax and Maxmin criterion-Saddle point-Value of games-Games with saddle points-Two-person zero sum game.

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, 2017.
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, 2017.
2. Operations Research an Introduction, HamdyA.Taha, 8thEdition, Pearson Publications.
3. Operations Research, S.Kalavathy, 4th 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://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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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**		At least one question from each unit
K2, K 3	**C-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SEMESTER IV

PRACTICAL IV – JAVA PROGRAMMING LAB

Total Hours: 60 **COURSE CODE: CP21/4C/PR4**

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

COURSE OBJECTIVES:

To enable students to

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 methods)
9. Create a Database applet using JDBC.
10. Write an applet program to implement any two Layouts.
11. Write an applet program to implement graphic controls, fonts and colors.

COURSE OUTCOMES:

CO Number	CO Statement
CO1	Apply the basic fundamentals of Decision making and looping concepts of Java programming.
CO2	Compute Java programs using String and line functions.
CO3	Construct GUI based applications using AWT controls.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLYCORELATED-1 **N**O CORELATION-0

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

SEMESTER IV

WEB TECHNOLOGY

Total Hours:30 **COURSE CODE: CP21/4N/WBT**

CREDITS: 2 **L-T-P: 1-0-1**

COURSE OUTLINE:

UNIT I:

Introduction to HTML: HTML Tags- Commonly used HTML Commands. Lists: Types of Lists. Adding Graphics to HTML Documents: Using Border, Width, Height, Align and Alt attribute. Tables: Using Width, Border, Cellpadding, Cellspacing, Background colour, Colspan and Rowspan attributes. Frames: Introduction to Frames.

UNIT II:

Dynamic HTML: Cascading Style Sheets- Class- Using the <Span> Tag-External Style Sheet- Using the <Div> Tag.

UNIT III:

Introduction to JavaScript: JavaScript in Web pages- Advantages of JavaScript-Writing JavaScript into HTML-Basic Programming Techniques- Operators and Expressions in JavaScript- JavaScript Programming Constructs- Functions in JavaScript-User Defined Functions-Dialog Boxes.

RECOMMENDED TEXT BOOKS:

1. Ivan Bayross, HTML, JavaScript, DHTML and PHP, 4th Edition.
2. Steven M. Schafer, HTML, XHTML and CSS Bible, 5th Edition, Wiley ,2010.
3. Jeremy Mcreak, Beginning JavaScript, 5th Edition, Wrox ,2018.

REFERENCE BOOKS:

1. Joe Casabona, HTML & CSS: Visual Quick Start Guide, 9th Edition, Peachpit Press, 2020.
2. Marijn Haverbeke, Eloquent JavaScript, 3rd Edition, No Starch Press, 2018.
3. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, Mastering HTML, CSS & JavaScript Web Publishing, 1st Edition, BPB Publications, 2016.
4. Thomas A. Powell, HTML & CSS: The Complete Reference, 5th Edition, McGraw Hill, 2010.

E-LEARNING SOURCES:

1. https://firstsiteguide.com/html-for-beginners
2. https://www.csestack.org/html-program-examples-output
3. https://www.tutorialsteacher.com/javascript/javascript-tutorials

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Learn how to combine basic HTML elements to create Web pages.
CO 2	Understand DHTML and XML basics for developing web applications.
CO 3	Utilize JavaScript programming concepts such as variables, conditionals and loops to solve real-life web development problems.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	3	2	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	3
AVERAGE	3	3	2.3	3	2.7	2.3

KEY: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O CORELATION-0

Practical paper questions will be framed by the course teacher.

SEMESTER V COURSE PROFILE-PROGRAMME OF STUDY

SEMESTER V								
COURSE CODE	**TITLE OF THE PAPER**	**CREDITS**	**HOURS/ WK**	**TOTAL HOURS**	**L-T-P**	**CA**	**SA**	**TOTAL**
CP21/5C/ASP	ASP.NET	4	5	75	3-2-0	40	60	100
CP21/5C/SOE	Software Engineering	4	5	75	3-2-0	40	60	100
CP21/5C/CAR	Computer Architecture	4	5	75	3-2-0	40	60	100
CP21/5C/OPS	Operating Systems	4	5	75	3-2-0	40	60	100
CP21/5E/DMW CP21/5E/ARI CP21/5E/CCP	Elective -I :Data Mining and Data Warehousing OR Elective -I: Artificial Intelligence OR Elective –I Cloud Computing	4	6	90	4-2-0	40	60	100
CP21/5C/PR5	Practical V- ASP.NET Lab	3	4	60	0-0-4	40	60	100

Credits gained during Semester V: 23

SEMESTER V

ASP.NET

Total Hours:75 **COURSE CODE: CP21/5C/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. Greg Buczek, Asp.Net Developer's Guide, Tata Mc-Graw-Hill, Edition 2017.
2. Matthew Macdonald, The Complete Reference ASP.NET, Tata Mc-Graw-Hill, Edition 2017.

REFERENCE BOOKS:

1. Programming Microsoft Asp.Net 2.0, Dino Eposito, WP Publishers and Distributors Pvt. Ltd, 3rd Edition, 2014.
2. Jon Galloway, Brad Wilson, Professional Asp.NET MVC 5(WROX), Wiley, 2014.
3. Andrew Lock, Asp.Net Core in Action, 2nd Edition, Manning Publications, 2021.
4. Adam Freeman, Pro Asp.Net core 3,8thEdition, APress, 2020.
5. Valerio De Sanctis,Asp.Net Core 5 and Angular 11,4thEdition,Packt Publishing, 2021.

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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 V

SOFTWARE ENGINEERING

Total Hours: 75 **COURSE CODE: CP21/5C/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. Agile development: What is agility- agile process – agility principles – Extreme Programming: XP Process – Industrial XP.

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. Software Testing techniques: Testing – White-box testing, basis path testing and Black box testing.

RECOMMENDED TEXTBOOKS:

1. R.S.Pressman, "Software Engineering – A Practioner's Approach", McGraw Hill, 8th Edition, 2019.
2. Richard Fairley,"Software Engineering concepts", Indian Edition , McGraw Hill Education, 2017.

REFERENCE BOOKS:

1. Ian Sommerville, "Software Engineering",Addison Wesley, 10th Edition, 2017.
2. Rajib Mal, "Fundamental of Software Engineering", PHI, 4thEdition, 2014.
3. Mark Richards, Neal Ford,"Fundamentals of Software Architecture-An Engineering Approach", O'Reilly Media, 1st Edition, 2020.
4. Len Bass, Paul Clements, Rick Kazman "Software Architecture in Practice", Addison-Wesley Professional, 4th Edition, 2021.
5. Imran Ghani, Dayang Norhayati Abang Jawawi, Siva Dorairaj, Ahmed Sidky, "Emerging Innovations in Agile Software Development", IGI Global, 1st Edition, 2016.

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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: CP21/5C/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", Pearson Publication,3rd Edition, 2017.
2. Nicholas P Carter, Raj Kamal,"Computer Architecture and Organisation", Schaum's Outline Series, 2nd Edition, 2017.

REFERENCE BOOKS:

1. Jim Ledin, "Modern Computer Architecture and Organization", Packt Publishing, Illustrated Edition, 2020.
2. William Stallings,"Computer Organization and Architecture",Pearson Education India, 11th Edition, 2018.
3. Linda Null, Julia Lobur," The Essentials of Computer Organization and Architectures", Jones & Bartlett Learning, 5thEdition, 2018.
4. John L Hennessy, David A Patterson,"Computer Architecture: A Quantitative Approach", Morgan Kaufmann, 6thEdition, 2017.
5. Andrew S. Tanenbaum," Structured Computer Organization", Pearson Education India, 6th Edition, 2016.

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.

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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

OPERATING SYSTEMS

Total Hours: 75 **COURSE CODE: CP21/5C/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.

UNIT II:

Process Concept –Process scheduling– Inter-process Communication. Process Scheduling: Basic Concepts, Scheduling Criteria –Scheduling Algorithms. Synchronization: Background, the Critical-section problem– Semaphores– Classical problems of synchronization.

UNIT III:

Deadlock: System Model-Characterization-Deadlock Prevention-Deadlock Avoidance-Detection-Recovery.

UNIT IV:

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 V:

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

RECOMMENDED TEXTBOOKS:

1. Abraham Silberschatz, Peter.B.Galvin, Gerg Gagne, "Operating system concepts", John Wiley & Sons, 10th Edition, 2018.
2. Greg Tomsho,"Guide to Operating Systems", Cengage Learning,5th Edition, 2016.

REFERENCE BOOKS:

1. Inderjeet Kaur, Sonam Gupta,"Operating systems: A concept- based approach", Dreamtech Press, 2020.
2. William Stallings, "Operating systems: Internal and Design Principles", Pearson, 9thEdition, 2017.
3. Andrew S Tanenbaum, "Modern Operating Systems", Pearson India, 4th Edition, 2016.

JOURNALS:

1. International Journal of Trend in Scientific Research and Development (IJTSRD)
2. Journal of Operating Systems Development & Trends (JoOSDT)

E-LEARNING SOURCES:

1. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/1_Introduction.htm
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 about how to handle the deadlock.
CO 4	Describe the concept of paging and segmentation from Memory management.
CO 5	Apply different Page replacement algorithm.

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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: 90 **COURSE CODE: CP21/5E/DMW**

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

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”, The Orient Blackswan,4th Edition,2016.
2. Parteek Bhatia, “Data Mining and Data Warehousing: Principles and Practical Techniques”, Cambridge University Press,2019.

REFERENCE BOOKS:

1. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, "Introduction to Data mining", Pearson, 2nd Edition,2021.
2. Kris Jamsa,“Introduction to Data Mining and Analytics”, Jones & Bartlett, 2020.
3. Nenad Jukic, Susan Vrbsky, Svetlozar Nestorov, “Database Systems: Introduction to Databases and Data Warehouses”, Prospect Pres, 1st Edition, 2016.

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. http://dwgeek.com/various-data-mining-clustering-algorithms-examples.html/

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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: 90 **COURSE CODE: CP21/5E/ARI**

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

COURSE OBJECTIVES:

1. Study the concepts of Artificial Intelligence.
2. Learn the methods of solving problems using Artificial Intelligence.
3. Introduce the concepts of Expert Systems.
4. Implement a futuristic AI application.

COURSE OUTLINE:

UNIT I:

Artificial Intelligence: AI Problems – AI Techniques – Tic Tac Toe. Problems, Problem spaces and Search: Defining the problem of space search – State space search–Production Systems– Problem Characteristics – Production System Characteristics.

UNIT II:

Heuristic search techniques – Generate and test – Hill Climbing – Best First Search: OR Graphs – A* Algorithms – Problem Reduction– Constraint Satisfaction – Means Ends Analysis.

UNIT III:

Knowledge Representation issues: Representations and Mappings – Approaches. Using Predicate Logic: Representing in simple facts in logic – Representing instance and Isa Relationship – Computable functions and predicates – Resolution.

UNIT IV:

Representing Knowledge using Rules: Procedural Vs Declarative Knowledge – Logic Programming – Forward Vs Backward Reasoning.

UNIT V:

Prolog-The Natural Language of Artificial Intelligence: Converting English to Prolog Facts and Rules-Goals-Prolog Terminology-Variables-Control Structures-Arithmetic Operators-Matching in Prolog-Backtracking-Cuts-Recursion-Lists.

RECOMMENDED TEXT BOOKS:

1. Elaine Rich, Kelvin Knight, Sivashankar B Nair, Artificial Intelligence, McGraw Hill Education Pvt Ltd, 2nd Edition, 2018.
2. S. Russell , P. Norvig, Artificial Intelligence: A Modern Approach, Pearson Education India,3rd Edition, 2015.

REFERENCES:

1. James v Stone, Artificial Intelligence Engines: A Tutorial Introduction to Mathematics of Deep Learning, Sebtel press,2019.
2. Dr. Dheeraj Mehrotra, Basics of Artificial Intelligence & Machine Learning, Notion Press, 1st Edition ,2019.
3. Tom Taulli, Artificial Intelligence Basics, Apress,2019.

E-LEARNING RESOURCES:

1. https://www.javatpoint.com/artificial-intelligence-tutorial
2. https://www.tutorialspoint.com/artificial_intelligence/inedx.htm

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Given a search problem, analyze and formalize the problem.
CO 2	Introduce Basic Principles, Techniques and Applications of Artificial Intelligence.
CO 3	Represent knowledge using predicate logic.
CO 4	Implement Basic AI Algorithms.
CO 5	Able to compare AI with Human Intelligence and Traditional Processing.

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	3	3	3
CO 2	3	3	3	3	3	3
CO 3	2	3	1	2	3	1
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Average	**2.8**	**3**	**2.6**	**2.8**	**3**	**2.6**

KEY: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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 V

ELECTIVE I-CLOUD COMPUTING

Total Hours: 90 **COURSE CODE: CP21/5E/CCP**

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

COURSE OBJECTIVES:

1. To develop the understanding of fundamentals and technological aspects of Cloud Computing.
2. To know the services of cloud computing.
3. To appreciate the emergence of cloud as the next generation computing paradigm.
4. To know the basic ideas and principles in cloud management techniques.
5. To comprehend basic consideration for designing cloud computing environment.

COURSE OUTLINE:

UNIT I:

Cloud Computing: Introduction- History of Cloud Computing- Characteristics of Cloud- Issues and Challenges for cloud computing-Advantages and Disadvantages of Cloud Computing-Threats to cloud computing. Cloud Computing Architecture: Introduction- Cloud Architecture- Cloud Computing Models- Service Models- Deployment Models.

UNIT II:

Virtualization in Cloud: Introduction-Virtualization-Implementation of Virtualization-Advantages of Virtualization-Virtualization Implementation Techniques-Types of Virtualization-Load Balancing in Cloud Computing.

UNIT III:

Security Issues and Challenges in Cloud Computing: Security challenges in Cloud Computing-Information security in cloud computing. Security Management: Security issues in cloud computing- Classification of Security issues- Types of Attackers-Emerging trends in Security and privacy.

UNIT IV:

Web Services: Introduction- Amazon web services- Microsoft Azure- Google App engine. Data Security and Privacy: Data security- Privacy. Service Oriented Architecture: Introduction- SOA components-Design Principles of SOA-SOA Requirements- Benefits of SOA-Web Services-Web service architecture-Properties of web service- Web services standards.

UNIT V:

Cloud Computing Applications: Introduction-Business Applications-Finance and banking Application-Cloud computing in education. Standards in Cloud Computing: Standardization Activities-Challenges-Fields of Standardization-Role of standards in cloud computing environments. Mobile Cloud Computing: Need of Mobile Cloud Computing-Mobile Cloud Computing Architecture-Technologies for MCC-Issues in MCC.

RECOMMENDED TEXTBOOKS:

1. V.K. Pachghare, Cloud Computing, PHI Learning Pvt Ltd,2016.
2. Surbhi Rastogi, Cloud Computing Simplified, 1st Edition, BPB Publications, 2021.

REFERENCE BOOKS:

1. John R. Vacca, Cloud Computing Security: Foundations and Challenges, 2nd Edition, CRC Press, 2020.
2. Naresh Kumar Sehgal, Pramod Chandra P. Bhatt, John M. Acken, Cloud Computing with Security: Concepts and Practices, 2nd Edition, Springer, 2019.
3. A. Kannammal, Fundamentals of Cloud Computing, 1st Edition, Cenage India, 2018.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, 1st Edition, TMH, 2017.
5. Kumar Saurabh, Cloud Computing: Architecting Next-Gen Transformation Paradigms, 4th Edition, Wiley, 2017.

JOURNALS:

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

E-LEARNING RESOURCES:

1. https://mindmajix.com/what-is-cloud-computing
2. https://www.educba.com/virtualization-in-cloud-computing
3. https://searchaws.techtarget.com/definition/Amazon-Web-Services
4. https://www.c-sharpcorner.com/article/introduction-to-cloud-computing-and-service-model

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Demonstrate the architecture and infrastructure of cloud computing.
CO 2	Enabling to design the system, network and storage virtualization and outline their role in cloud computing system model.
CO 3	Describe the various security issues and challenges for all social applications.
CO 4	Enabling to generate new ideas and innovations in cloud computing based on the various web services.
CO 5	Articulate the key technologies, strength and limitations of cloud computing and possible applications.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	3	2	3	3	3
CO2	3	3	3	3	3	3
CO3	2	3	2	3	3	3
CO4	3	3	2	3	3	3
CO5	2	3	3	3	3	2
AVERAGE	2.4	3	2.4	3	3	2.8

KEY: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2**W**EAKLY CORELATED-1 **N**O 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-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SEMESTER V

PRACTICAL V – ASP.NET LAB

Total hours: 60 **COURSE CODE: CP21/5C/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 Number	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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O CORELATION-0

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

SEMESTER VI COURSE PROFILE-PROGRAMME OF STUDY

SEMESTER VI								
COURSE CODE	**TITLE OF THE PAPER**	**CREDITS**	**HOURS/ WK**	**TOTAL HOURS**	**L-T-P**	**CA**	**SA**	**TOTAL**
CP21/6C/USP	Unix and Shell Programming	4	5	90	3-2-0	40	60	100
CP21/6C/DCN	Data Communication Networking	3	5	90	3-2-0	40	60	100
CP21/6C/RDS	R Programming with Data Science	4	5	90	3-2-0	40	60	100
CP21/6E/IOT CP21/6E/MAL CP21/6E/SEM	Elective II-Internet of Things Or Elective II- Machine Learning Or Elective II –Security Management	4	5	90	3-2-0	40	60	100
CP21/6C/MNP	Mini Project	2	6	90	0-0-6	40	60	100
CP21/6C/PR6	Practical VI- Unix and R Programming Lab	3	4	60	0-0-4	40	60	100

Credits gained during the Semester VI: 20

SEMESTER VI

UNIX AND SHELL PROGRAMMING

Total Hours: 90 **COURSE CODE: CP21/6C/LNP**

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

COURSE OBJECTIVES:

To enable students

1. To learn the important concepts in UNIX.
2. To learn the program basics in shell scripts.
3. To study utilities, file directories, process and inter-process communications in detail.

COURSE OUTLINE:

UNIT I:

Introduction: Features of UNIX- UNIX Environment- UNIX Structure- Accessing UNIX- Commands- Common Commands- Other Useful Commands.

UNIT II:

Basic vi Editor: Editor Concepts-The vi Editor- Modes- Commands.

UNIT III:

File Systems: Filenames- File Types- Directories- Operations Unique to Directories – Operations Unique to Regular Files- Operations Common to Both- Security and File Permission: Users and Groups- Security Levels- Changing Permissions- User Masks- Changing Ownership and Group.

UNIT IV:

Introduction to Shells: Standard Streams- Redirection- Pipes- tee Command- Command Execution- Quotes- Variables- Predefined Variables- Filters: Filters and Pipes- Concatenating Files- Display Beginning and End of Files- Cut and Paste- Sorting- Translating Characters- Files with Duplicate Lines- Count Characters, Words, or Lines- Comparing Files.

UNIT V:

Regular Expressions: Atoms- Operators- grep: Operation- grep Family- Searching for File Content.

RECOMMENDED TEXT BOOKS:

1. Behrouz A, Forouzan, Richard F. Gilberg, "UNIX and Shell Programming", Cengage Learning, 2014.
2. Sumitabha Das , "Unix Concepts and Applications", TMH, 4th Edition, 2017.
3. N.Matthew, R.Stones, Wrox, "Beginning Linux Programming", 4th Edition, Wiley India Edition.

REFERENCE BOOKS:

1. Cameron Newham, Learning the bash shell: UNIX shell programming, O'Reilly, 3rd Edition.
2. W. Richard Stevens, Stephen A Rago, Advanced Programming in the UNIX Environment, Pearson Education, 3rd Edition.
3. Richard Petersen, Linux: The Complete Reference, McGraw Hill Education, 6th Edition,2017.
4. Stephen Kochan, Patrick Wood, Shell Programming in UNIX, LINUX and OS X, Pearson Education, 4th Edition, 2017.

JOURNALS:

1. Journal of Advances in Shell Programming
2. International Journal of Creative Research thoughts

E-LEARNING SOURCES:

1. https://www.tutorialspoint.com/unix/
2. https://javapoint.com/linux-tutorial
3. http://www.xpcourse.com/w3schools-unix-tutorial

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Outline the basics in Linux programming.
CO 2	Develop programs in shell.
CO 3	Handling files and directories.
CO 4	Develop shell script in process and signals.
CO 5	Develop script for inter-process communication.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

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

KEY: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2**W**EAKLY CORELATED-1 **N**O 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 VI

DATA COMMUNICATION NETWORKING

Total Hours: 90 **COURSE CODE: CP21/6C/DCN**

Credits: 3 **L T P: 3- 2 -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 Transmission: Analog -to- Digital Conversion –Analog Transmission: Digital-to-Analog Conversion.

UNIT II:

The Physical Layer and Media: Data and Signal: Transmission impairment – Performance - Bandwidth Utilization: Multiplexing and Spreading: Multiplexing - Transmission Media: Guided Media – Unguided Media: Wireless – Switching: Structure of a Switch.

UNIT III:

Data Link Layer – Error Detection and Error Correction: Block Coding – Cyclic Redundancy Check – Checksum – Wireless LANs: Bluetooth – Architecture.

UNIT IV:

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

UNIT V:

Transport Layer: Process – to – Process Delivery: UDP,TCP, and SCTP: TCP – TCP Services – TCP Features – Segment – TCP Connection – Application Layer: Domain Name System : Name space – Domain Name Space – Remote Logging, Electronic Mail, and File Transfer: TELNET – Electronic Mail – File Transfer Protocol (FTP).

RECOMMENDED TEXT BOOKS:

1. Behrouz A Forouzan, Data Communications and Networking, Tata McGraw Hill, 4 th Edition, 2017.
2. William Stallings, Data and Computer Communications, Pearson Education,10th Edition, 2017.
3. James F.Kurose, Keith W.Ross , Computer Networking-A Top Down Approach, Pearson Publications, 6th Edition, 2017.

REFERENCE BOOKS:

1. Andrew S.Tannenbaum, Computer Networks, Pearson Professional Education, 5 th Edition.
2. Larry Peterson, Bruce Davie, Computer Networks- A System Approach, Morgan Kaufmann Series, 6th Edition, 2021.
3. I. Chandra Mohan, Fundamentals of Computer Networks, Dreamtech Press 2019.

JOURNALS:

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

E-LEARNING SOURCES:

1. https://searchnetworking.techtarget.com/definition/OSI
2. http://www.eecs.umich.edu/courses/eecs373.w05/lecture/errorcode.html
3. http://ecomputernotes.com/computernetworkingnotes/routing/routing-algorithms
4. 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:**S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2**W**EAKLY CORELATED-1 **N**O 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

R PROGRAMMING WITH DATA SCIENCE

Total Hours: 90 **COURSE CODE: CP21/6C/RDS**

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

COURSE OBJECTIVES:

1. To explore and understand how to use the R documentation
2. To Read Structured Data into R from various sources
3. To enable the students, understand and use- lists, vectors, matrices, data frames, etc.
4. To understand the basic concepts of data science.

COURSE OUTLINE:

UNIT I:

Getting Started: How to Run R – Introduction to functions. Vectors: Scalars, Vectors, Arrays and Matrices – Declarations – Recycling – Common Vector Operations – Using all() and any() – Vectorized Operations – NA and NULL Values – Filtering – A Vectorized if-then-else – Testing Vector Equality – Vector Element Names – More on c(). Matrices and Arrays: Creating Matrices – General Matrix Operations – Applying Functions to Matrix Rows and Columns – Adding and Deleting Matrix Rows and Columns - More on the Vector/Matrix Distinction – Avoiding Unintended Dimension Reduction – Naming Matrix Rows and Columns – Higher-Dimensional Arrays.

UNIT II:

Lists: Creating Lists – General List Operations – Accessing List Components and Values – Applying Functions to Lists – Recursive Lists. Data Frames: Creating Data Frames – Other Matrix-Like Operations – Merging Data Frames – Using lapply() and sapply() on Data Frames. Factors and Tables: Factors and Levels – Common Functions Used with Factors – Working with Tables – Other Factor and Table-Related Functions.

UNIT III:

R Programming Structures: Control Statements – Arithmetic and Boolean Operators and Values – Default Values for Arguments – Return Values – Functions Are Objects – Environment and Scope Issues – No Pointers in R – Writing Upstairs – Recursion - Replacement Functions – Tools for Composing Function Code – Writing Your Own Binary Operations – Anonymous Functions. Doing Math and Simulations in R: Sorting – Set Operations – Simulation Programming in R. Object-Oriented

Programming: S3 Classes – S4 Classes – Managing Your Objects. Input/Output: Accessing the Keyboard and Monitor – Reading and Writing Files.

UNIT IV:

String Manipulation: An Overview of String-Manipulation Functions – Regular Expressions – Graphics: Creating Graphs – Customizing Graphs – Saving Graphs to Files – Debugging: Why Use a Debugging Tool? – Using R Debugging Facilities: Single-Stepping with the debug() and browser() Functions – Setting Breakpoints – Tracking with the trace() Function.

UNIT V:

Introduction to Data Science-Introduction-Definition-Data Science in various fields-Examples - Impact of Data Science - Data Analytics Life Cycle - Data Science Toolkit – Data Scientist- Data Science Team - Understanding data: Introduction – Types of Data: Numeric – Categorical – Graphical – High Dimensional Data– Classification of digital Data: Structured, Semi-Structured and Un-Structured - Example Applications. Sources of Data: Time Series–Transactional Data–Biological Data–Spatial Data–Social Network Data–Data Evolution.

RECOMMENDED TEXTBOOKS:

1. Norman Matloff, "The Art of R Programming", No Starch Press.
2. Davy Cielen, Arno D B Meysman, Mohamed Ali, Introduction to Data Science, Manning Publications,2016.

REFERENCE BOOKS:

1. Hadley Wickham, Garrett Grolemund, R for Data Science, O'Reilly , 1st Edition, 2016.
2. Jeffrey S Saltz, Jeffrey M Stanton, An Introduction to Data Science", SAGE Publication, 1st Edition,2018.
3. Mark Gardener, Beginning R- The Statistical Programming Language, John Wiley & Sons, Inc.,2012.

JOURNALS:

1. The R Journal (r-project.org)
2. Data Science Journal (codata.org)
3. International Journal of Data Science and Analytics | Home (springer.com)

E-LEARNING RESOURCES:

1. https://www.youtube.com/watch?v=_V8eKsto3Ug
2. https://www.r-project.org/about.html
3. https://www.youtube.com/watch?v=3iSKFCKLUsI
4. https://www.upgrad.com/blog/basic-concepts-data-science/

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Able to learn install and configure R programming software and write programs for some basic concepts
CO 2	Able to design and develop programs using lists and data frames
CO 3	Leaning the concepts of control statements, operators and files.
CO 4	Learning the concepts of Strings and Graphs.
CO 5	Able to understand the data science concepts and classification of digital data

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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 VI

ELECTIVE II - INTERNET OF THINGS

TOTAL HOURS: 90 **COURSE CODE: CP21/6E/IOT**

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

COURSE OBJECTIVES:

1. To learn the fundamentals of IoT and its hardware / software components.
2. To understand the platform for IoT devices and various protocols involved in their communication.
3. To understand IoT Market perspective and state of the Art – IoT – Architecture.
4. To study real world IoT applications, design constraints, Industrial automation and commercial building automation in IoT.

COURSE OUTLINE:

UNIT I:

Introduction to Internet of Things-Definition and Characteristics of IoT-Physical Design of IoT-Logical Design of IoT-IoT Enabling Technologies-IoT levels and Deployment Templates.

UNIT II:

IoT and M2M-Introduction-M2M-Difference between IoT and M2M-SDN and NFV for IoT.

UNIT III:

IoT Platform Design Methodology-Introduction-IoT Design methodology.

UNIT IV:

IoT Physical Devices and Endpoints-What is an IoT Devices-Exemplary Device: Raspberry Pi-About the Board-Linux on Raspberry Pi-Raspberry Pi Interfaces-Programming Raspberry Pi with Python-Other IoT Devices.

UNIT V:

Tools for IoT- Introduction-Chef-Chef Case Studies-puppet-Puppetr Case Study-Multi-tier Deployment-NETCONF-YANG Case Studies.

RECOMMENDED TEXT BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014

REFERENCE BOOKS:

1. Internet of Things: Introduction to a New Age of Intelligence by Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Aves and, Stamatis Karnouskos and David Boyle.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017.

E-LEARNING RESOURCES:

1. www.edureka.co/blog/iot-tutorial
2. www.tutorialspoint.com/internet_of_things
3. www. data-flair.Training/blogs/iot-tutorial/

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:**S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2**W**EAKLY CORELATED-1 **N**O 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

ELECTIVE II- MACHINE LEARNING

Total Hours: 90 **COURSE CODE:CP21/6E/MAL**
CREDITS : 4 **L-T-P: 3-2- 0**

COURSE OBJECTIVES:

1. To get the idea about concepts of machine learning and its applications
2. To learn the concepts of feature engineering.
3. Understanding various algorithms of classification for supervised machine learning
4. Understanding various algorithms of clustering and association rule mining for unsupervised machine learning.
5. Enabling to build the applications using machine leaning for various domains.

COURSE OUTLINE:

UNIT I:

Introduction to Machine Learning: Need for Machine Learning- Types of Machine Learning- Application of Machine Learning- Languages and tools in Machine Learning- Basic types of data in Machine Learning- Data quality and Data pre-processing tools in Machine Learning.

UNIT II:

Model Selection and Feature Engineering: Introduction- Selecting a model, Training a model, Feature extraction and engineering- Feature engineering on numerical data, categorical data and text data- Feature scaling- Feature Selection- Dimensionality reduction.

UNIT III:

Supervised Learning: Introduction-Examples of Supervised Learning-Classification Model-Classification Learning Steps-Importance of Bayesian method, Bayes theorem and concept learning. Classification Algorithms: K nearest neighbour (KNN), Decision Tree- Random Forest model- Support Vector Machine.

UNIT IV:

Unsupervised Learning: Introduction-Unsupervised Vs Supervised Learning-Application of Unsupervised Learning. Clustering: Types of Clustering Techniques- Partition methods- K-Medoid - Hierarchical clustering- DBSCAN-Finding patterns using association rule mining- Apriori algorithm.

UNIT V:

Basics of Neural Network**:** Introduction- Artificial neurons- Types of activation functions- implementation of ANN- Architecture of Neural network- Learning

Process in ANN- Active Learning- Memory based Learning-Bootstrap aggregation- Boosting- Gradient Boosting Machines- Introduction to Deep Learning and its need and applications.

RECOMMENDED TEXT BOOKS:

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning, 3rd Edition, Pearson, 2019.

2. Anuradha Srinivasa Raghavan, Vincy Joseph, Machine Learning, 1st Edition, Wiley, 2019.

REFERENCE BOOKS:

1. Tom M Mitchell, Machine Learning, McGraw Hill, 2017.
2. Ethem Alpaydm, Introduction to Machine Learning, 3rd Edition, MIT Press, 2015.

JOURNALS:

1. Machine Learning Tools and Algorithm Techniques.
2. Journal of Machine Learning Research
3. Machine Learning and Knowledge Extraction

E-LEARNING SOURCES:

1. https://www.geeksforgeeks.org/machine-learning/
2. https://www.tutorialspoint.com/machine_learning_with_python/index.htm
3. Unit IV: (Unsupervised Learning and Clustering) https://www.youtube.com/watch?v=NhimXdFenrg
4. Unit IV: (Pattern Learning) https://www.youtube.com/watch?v=U5xsX2ersHQ &list=PLbRMhDVUMngcx- ATexXZH_-u1wsIGIiyS

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Explore the fundamental issues and challenges in Machine Learning including data and model selection and complexity.
CO 2	Appreciate the underlying mathematical relationships within and across Machine Learning Algorithms.
CO 3	Evaluate the various Supervised Learning algorithms using appropriate Dataset.
CO4	Evaluate the various unsupervised Learning algorithms using appropriate Dataset.
CO5	Design and implement various machine learning algorithms in a range of real-world 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	2	3	2	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	3
CO4	3	3	2	3	2	3
CO5	3	3	3	3	3	3
AVERAGE	3	3	2.4	3	2.6	2.6

KEY: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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 VI

ELECTIVE II- SECURITY MANAGEMENT

Total Hours: 90 **COURSE CODE: CP21/6E/SEM**

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

COURSE OBJECTIVES:

To enable students

1. To provide an understanding of principal concepts, major issues, technologies and basic approaches in information security.
2. To protect consumers from online frauds.
3. To have and maintain ethical code of conduct in the cyber world.
4. To learn about physical security threads and how to protect information using physical security controls.
5. Give Learners in Depth knowledge of Information Technology Act and Legal framework of Right to Privacy, Data Security and Data Protection.

COURSE OUTLINE:

UNIT I:

Information Security Principles of Success: Introduction – Twelve Principles. Confidentiality and Integrity Models –Law, Investigations and Ethics: Types of Computer Crime – How Cyber Criminals Commit Crimes – The Computer and the Law – Intellectual Property Law. Physical Security Control: Introduction – Understanding the Physical Security Domain Physical Security Threats.

UNIT II:

Operations Security: Operations Security Controls in Action. Access Control Systems and Methodology: 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 – Examining Digital Cryptography.

UNIT III:

Introduction to Cybercrime - Cybercrime: Definition and Origins of the Word - Cybercrime and Information Security - Who are Cybercriminals? - Classifications of Cybercrimes. Cyberoffenses: How Criminals Plan Them - How Criminals Plan the Attacks - Social Engineering – Cyber talking –Cybercafe and Cybercrimes.

UNIT IV:

Cybercrime: Mobile and Wireless Devices - Trends in Mobility - Credit Card Frauds in Mobile and Wireless Computing Era - Security Challenges Posed by Mobile Devices - Registry Settings for Mobile Devices - Attacks on Mobile/Cell Phones. Tools and Methods Used in Cybercrime: Proxy Servers and Anonymizers – Keyloggers and Spywares - Virus and Worms - Trojan Horses and Backdoors – Steganography - Attacks on Wireless Networks.

UNIT V:

Forensics of Hand-Held Devices: Hand-Held Devices and Digital Forensics - Toolkits for Hand -Held Device Forensics. Cybercrime and Cyberterrorism: Social, Political, Ethical and Psychological Dimensions: Intellectual Property in the Cyberspace - The Ethical Dimension of Cybercrimes. Cybercrime: Real-Life Examples - Illustrations, Examples and Mini-Cases - Digital Forensics Case Illustrations - Online Scams.

RECOMMENDED BOOKS:

1. Mark Merkow and Jim Breithaupt, Information Security: Principles and Practices by, Pearson Education, 2nd Edition, 2014.
3. Michael E. Whitman and Herbert J. Mattord, Principles of Information Security with Mind Tap,Cengage learning India Pvt. Ltd, 2018.
4. Athul Kahate, Cryptography and Network Security McGraw-Hill, 2019.

REFERENCE BOOKS:

1. Michael C.Redmond, Mastering your Introduction to Cyber Security, Booklocker.com publication, 2018.
2. Charles Pfluger, Security in Computing, Prentice Hall of India, 4th Edition, 2015.
3. Stallings William, Cryptography and Network Security, Pearson, 7th Edition, 2017.
4. Bongsik Shin, A practical Introduction to Enterprise Network and Security Management, CRC Press, 2nd Edition, 2021.

JOURNALS:

1. https://ieeexplore.ieee.org/abstract/document/9116415
2. https://www.springer.com/journal/145
3. https://www.journals.elsevier.com/forensic-science-international

E-LEARNING SOURCES:

1. https://www.geeksforgeeks.org/what-is-information-security/
2. https://www.javatpoint.com/cyber-security-introduction
3. https://www.simplilearn.com/tutorials/cyber-security
4. https://intellipaat.com/tutorial/ethical-hacking-cyber-security-tutorial/

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	Apply Scientific knowledge for finding sustainable solution to solve real-time problems.
CO5	Increases awareness among the masses in order to have a gleeful social life, be it online or offline.

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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 VI

PRACTICAL VI – UNIX AND R PROGRAMMING LAB

Total Hours: 60 **COURSE CODE: CP21/6C/PR6**

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

COURSE OBJECTIVES:

To enable students to

1. Install and configure R Programming development tools.
2. Save state information across important operating system events.
3. To understand and make effective use of Unix utilities and Shell scripting language to solve problems.
4. To develop the basic skills necessary for systems programming including file system programming.

PRACTICAL LIST:

LINUX:

Shell script, sed, grep /egrep

1. To display “shell scripting”.
2. To get current date, time, user name and current working directory.
3. To perform arithmethic operation with numbers(input as command Line Argument)
4. To display list of users currently logged in.
5. To check whether the given number is even or odd.
6. To check whether given file is a directory or not.
7. To count number of files in a Directory.
8. To copy contents of one file to another
9. Create directory, write contents on that and Copy to a suitable location in the home directory
10. To find the number of words character, words and lines in a file.
11. To display list of files in the directory.
12. To remove duplicate lines in a file.

R PROGRAMMING:

1. Write a R program to take input from the user (name and age) and display the values. Also print the version of R installation.
2. Write a R program to create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91.
3. Write a R program to get the details of the objects in memory.
4. Write a R program to create a vector which contains 10 random integer values between -50 and +50.
5. Write a R program to get the first 10 Fibonacci numbers.
6. Write a R program to get all prime numbers up to a given number.
7. Study and implementation of various control structures in R.
8. Write a R program to Find Sum, Mean and Product of a Vector.
9. Write a R program to find the maximum and the minimum value of a given vector.
10. To create a list with vectors/list/range operator in R.
11. Write a R program to Find the count of elements using the length and length function.
12. Write a R program to Create a list with random values in R.
13. Write a R program to convert the list to array.
14. Write a R program to Perform various matrix operation in R.
15. Study and implement the use of Data Frames in R.
16. Write a R program to create an empty Data Frame.
17. Write a R program to Extract first N rows from Data Frame in R.
18. Write a R program to Adding Column to the Data Frame.
19. Write a R program to Adding Colors to Charts in R Programming.
20. Write a R program to find the Recursion.

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Understanding the basic term, syntax in R programming.
CO 2	Able to apply the concept in R programming application.
CO 3	Able to create a simple mathematical computation using R programming.
CO 4	Develop simple shell scripting programs in Unix.
CO 5	Develop simple directory scripts.

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	3	1	2	2	-
CO5	2	2	1	1	3	2
AVERAGE	3	2.2	2	2.3	2.3	0

KEY: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O CORELATION-0

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

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SEMESTER VI

MINI PROJECT

Total Hours: 90 **COURSE CODE: CP21/6C/MNP**

CREDITS: 2 **L T P: 0- 0 -6**

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 development.

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: **S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2 **W**EAKLY CORELATED-1 **N**O 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

Self Study Paper- OBJECT ORIENTED PROGRAMMING IN C++

CREDITS:2 **COURSE CODE: CP21/SS/CPP**

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 TEXTBOOKS:

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

REFERENCE BOOKS:

1. 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.