JAYARAJ ANNAPACKIAM COLLEGE FOR WOMEN (AUTONOMOUS)

A Unit of the Sisters of St. Anne of Tiruchirappalli
Accredited with 'A^{+}' Grade (Cycle 4) by NAAC
DST FIST Supported College
Affiliated to Mother Teresa Women's University, Kodaikanal

PERIYAKULAM – 625 601, THENI DT. TAMIL NADU.

SYLLABUS 2020 - 2023

M. SC. COMPUTER SCIENCE

DEPARTMENT OF OMPUTER SCIENCE

M. Sc. COMPUTER SCIENCE SYLLABUS

With effect from 2020 - 2021

As per the guidelines of the UGC, TANSCHE and MTU, according to the current realities and emerging trends, the Integrated Curriculum of the M.Sc. Computer Science is restructured. It provides ample choice of subjects of study to our students, based on Weighted Credit Point System.

EXTRA CREDIT COURSES

To prepare the students for the National / State Eligibility Tests, **Discrete Mathematics (20PCS1C04)** is offered as a major core course in the first semester. Evaluation pattern for this course is **fully Comprehensive exam pattern**. Internal and External examinations have to be conducted in the **ONLINE** mode.

During the second semester, students should undergo a **MOOC** as Self-paced Learning and they have to submit the certificate to earn the extra credit. During Summer Holidays, students will undergo an **Internship** for 30 working days and viva-voce will be conducted in the first week of the third semester. They should submit the report of their internship at the time of viva voce and can earn 2 more credits. During third semester, the students are asked to do a Case Study using Big Data Analytics and Mining Techniques. Report should be submitted and review will be conducted along with the third semester practical examinations.

During the fourth semester, students will take up an **Industry based project** from November to January. They will **re-join the college** on the first Monday of February. They will take up their Mid and End semester examinations in the first week of March and last week of March of the academic year respectively.

The students can earn 2 extra credits each by doing a MOOC, Internship, Case Study and a Comprehensive Examination. For these courses, the pass will be indicated, credit will be given but not included for OPM.

PATTERN OF EVALUATION

For each paper, there will be continuous internal assessment (CIA) and Semester Examination (External). The Weightage ratiois

Paper	Internal	External	Total
Theory	25	75	100
Practical	40	60	100
Project	50	50	100
Case Study	100	-	100
Internship cum Mini Project	100	-	100

Components for the Continuous Internal Assessment (CIA) Theory:

Component	Marks	Marks
Internal test I	40	Converted to 25
Internal test II	40	
Seminar	10	
E-Material Preparation (PPT)	5	
Attendance	5	
Total	**100**	**25**

The Internal Components are:

Industry Based Project		**Internship cum Mini Project**		**Practical**	
Company Assessment	20	Company Assessment	30	Internal Test(2)	15
I Review	10	Viva	25	Lab Work	10
II Review	10	Result & Report	25	Record	10
Attendance	5+5	Presentation	20	Attendance	05
Total	**50**	**Total**	**100**	**Total**	**40**

Case Study

Component	Mark
Presentation	30
Techniques	25
Viva	25
Result & Report	20
Total	**100**

Passing Minimum

Semester Examination	
Theory	50% out of 75 Marks (i.e. 37.5 Marks)
Practical	50% out of 60 Marks (i.e. 30 Marks)

External Valuation of Industry based Project Work

Component	Marks
External Examiner (External Viva Voce)	50
Total	**50**

INTERNAL QUESTION PATTERN

(Maximum Marks - 40)

PART - A

10 Questions × 1 Mark = 10 Marks

PART - B

2 Questions × 5 Marks = 10 Marks

(Internal Choice and One Question from Each Unit)

PART - C

2 Questions × 10 Marks = 20 Marks

(Open Choice, Two Questions out of Three)

EXTERNAL QUESTION PATTERN (MAXIMUM MARKS-75)

PART - A

10 Questions × 1Mark = 10 Marks

(Two Questions from each Unit)

PART - B

5 Questions × 5 Marks = 25 Marks

(Internal Choice and one set of Question from each Unit)

PART - C

5 Questions × 8 Marks = 40 Marks

(Open, Five Questions out of Seven - At least One Question from each Unit)

QUESTION PATTERN FOR DISCRETE MATHEMATICS (20PCS1C04)

INTERNAL QUESTION PATTERN

(MAXIMUM MARKS-40 IN ONLINE MODE)

PART - A

40 Questions × 1Mark = 40 Marks (15 Questions from Each Unit)

EXTERNAL QUESTION PATTERN

(MAXIMUM MARKS-75 IN ONLINE MODE)

PART - A

75 Questions × 1Mark = 75 Marks (15 Questions from Each Unit)

P.G. PROGRAMME OUTCOMES

PO. NO.	UPON COMPLETION OF THIS PROGRAMME THE STUDENTS WILL BE ABLE TO
1.	Endow with in-depth knowledge, analyze and apply the understanding of their discipline for the betterment of self and society.
2.	Synthesize ideas from various disciplines, enhance the interdisciplinary knowledge and extend it for research.
3.	Gain confidence and skills to communicate orally/ verbally in research platforms and state a clear research finding.
4.	Develop problem solving and computational skills and gain confidence to appear the competitive examination.
5.	Enhance knowledge regarding research by accumulating practical knowledge in specific areas of research.
6.	Achieve idealistic goals and enrich the values to tackle the societal challenges.

P.G. M.Sc. COMPUTER SCIENCE PROGRAM SPECIFIC OUTCOMES

PSO	UPON COMPLETION OF THIS PROGRAMME THE STUDENTS WILL BE ABLE TO	PO MAPPED
PSO-1	**Develop Domain Expertise:** Acquire the basic knowledge of concepts and designs on modern computing platforms	PO-1,4,5
PSO-2	**Acquire Computing Skills and Ethics:** Apply the knowledge of programming skills to produce effective designs and solutions for specific problems and data management for the betterment of the society.	PO-1,4,5,6
PSO-3	**Inculcate Research:** Identify, analyze and synthesize scholarly literature relating to the field of computer science with life-long learning.	PO-1,2,3,5
PSO-4	**Develop Leadership Qualities:** Communicate effectively, to function efficiently on teams to accomplish shared computing design and evaluation or implementation goals through projects.	PO-3, 4, 6
PSO-5	**Produce Efficient Techno-Entrepreneurs:** To inculcate initiative, Innovative and professional outlook skilled elite for better industry acceptance and apply their computing expertise to promote entrepreneurship.	PO-2,3,4,6

M. Sc. COMPUTER SCIENCE SYLLABUS (UGC/ TANSCHE/ MTU) With effect from 2020 - 2021

Sem.	Code	Title of the Course	Hours	Credits
I	20PCS1C01	Advanced Java Programming	4	4
	20PCS1C02	Digital Electronics and Computer Architecture	4	4
	20PCS1C03	Data Structures and Algorithms	4	3
	20PCS1C04	Discrete Mathematics	4	3
	20PCS1E1A 20PCS1E1B 20PCS1E1C	Distributed Operating System Human Computing Interaction Information Security and Cyber Law	6	4
	20PCS1P01	Advanced Java Programming - Lab	5	3
	20PCS1P02	Digital Electronics - Lab	3	2
	Total		**30**	**23**
II	20PCS2C05	Mobile Application Development	4	4
	20PCS2C06	Microprocessor and Microcontroller	4	4
	20PCS2C07	Software Engineering	4	3
	20PCS2GE1	IDC (S -> S): Data science using R	4	3
	20PCS2E2A 20PCS2E2B 20PCS2E2C	Mobile Computing Computer Graphics Cloud Computing	6	4
	20PCS2P03	Mobile Application Development - Lab	3	2
	20PCS2P04	Microprocessor and Microcontroller - Lab	3	2
	20PSE2S01	Soft Skills	2	1
	20PCS2SM1	Self-paced Learning: MOOC Course	--	**1***
		Total	30	**23+1***
III	20PCS3C08	NoSQL Databases	4	4
	20PCS3C09	Data Science Using Python	4	4
	20PCS3C10	Data Communication and Network Security	4	4
	20PCS3GE2	IDC - (S -> A): Data Science using Spreadsheet	4	3
	20PCS3E3A 20PCS3E3B 20PCS3E3C	Big Data Analytics Digital Image Processing Artificial Intelligence	6	4
	20PCS3P05	NoSQL Database - Lab	3	2
	20PCS3P06	Data Science using Python - Lab	3	1
	20PSE3H01	Human Rights & Duties	2	1
	20PCS3IN1	Internship cum Mini Project - 30 Days During Summer Holidays	-	2*
	20PCS3CS1	Case Study Using Big Data Mining Techniques **	-	2*
		Total	**30**	**23+4***
IV	20PCS4C11	Internet of Things	5	5
	20PCS4C12	Machine Learning	5	5
	20PCS4R01	Industry Based Project	20	11
	20PCS4S01	Comprehensive Examination	-	2*
		Total	**30**	**21+2***
		Total for All Semesters	**120**	**90+7***

Self-paced Learning Course, Internship cum Mini Project and Case study- Purely Internal Courses

ADVANCED JAVA PROGRAMMING

Semester: I **Hours: 4**

Code : 20PCS1C01 **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Generalize the basic principles of Java such as Interface, packages and Threads, Exception handling	PSO-1, 2	K
CO-2	Demonstrate AWT and Swing	PSO-2	U
CO-3	Develop distributed applications using RMI and socket programming.	PSO-3	AP
CO-4	Design server-side programs using servlets	PSO-5	AP
CO-5	Explore advanced Java concepts using JDBC.	PSO-2,5	AN

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: I				**ADVANCED JAVA PROGRAMMING**							**Hours: 4**
Code : 20PCS1C01											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	3	3	3	3	3	4	4	3	3	3	3.27
CO-2	4	3	3	3	3	3	4	4	3	3	4	3.36
CO-3	4	3	3	4	3	3	4	4	3	3	3	3.36
CO-4	4	3	3	4	3	3	4	4	3	3	4	3.45
CO-5	5	3	3	4	4	4	5	5	3	4	4	4
Overall Mean Score												**3.49**

Result: The score for this course is **3.49** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

INSIDE JAVA -Java Tools : Introduction- Javadoc- Javap- Jcmd- Jhat- Jdb- Jar **Exception Handling**: Exceptions -Handling Exceptions - An Example - Types of Exceptions - Catching Exception **Multi-threading**: Introduction - Main Thread Using Sleep - Creating Thread - Extending - Interrupting Thread - Suspending and Resuming - Thread Priority - Using join() – Synchronization. **Garbage Collection:** Introduction - Exploring JVM- JVM Options -Garbage Collection - Generational Garbage Collector - HotSpot's Garbage Collection - Available Collectors

(12 Hours)

UNIT II

AWT and Swing: Introduction - AWT Class Hierarchy - Creating Container - Adding Components - Layout - Using Panel - Text Field - TextArea - List - Checkbox -Check Box Group -Choice - Event Handling - Dialog Boxes – ScrollBar – Menu – Swing. **Java and XML:** Introduction - XML and DOM -DOM Nodes -The Node Interface-Document Node - Element Node - Text Node - Attr Node - Parsing XML. **Input/Output :** Introduction – Streams - Formatting - Data Streams - Object Stream - Reading/writing Arrays via Streams - Pipes 256 - File I/O –Path – File.

(12 Hours)

UNIT III

NETWORK PROGRAMMING: Basic Networking: Java and the Net - Java Networking Classes and Interfaces - Getting Network Interfaces – URL. **Socket Programming:** Introduction - Client/server Programs - Sockets - TCP Sockets - UDP Sockets - Multicasting - 13.7 Multicast Sockets - **Remote Method Invocation:** Introduction - Remote Method Invocation - Java RMI Interfaces and Classes - An Application - Compiling the Program - Generating Stub Classes - Running the Program – Callback. **(12 Hours)**

UNIT IV

Applets: Client Side Java - Life Cycle -Writing an Applet - Generating Class File - Running the Applet – Security - Utility Methods - Using Status Bar - AppletContext Interface - Document Base and Code Base - Passing Parameter - Event Handling - Communication Between Two Applets. **Java XML RPC:** Introduction - XML-RPC Operational Principle - Data Types XML-RPC Messages Java XML-RPC - Installing the Apache XML - RPC Java Library - XML-RPC versus Java Data Types – Example - Dynamic Proxies - Using XmlRpcServlet - Using ServletWebServer – Introspection **Java and Soap:** Introduction - Differences with XML-RPC - Soap Architecture - SOAP Flavors - SOAP Messages - SOAP Binding - RPC Using SOAP - Web Service - JAX-WS. **(12 Hours)**

UNIT V

ENTERPRISE JAVA- Security: Introduction - Java Security Architecture **Servlet**: Server-side Java -Advantages Over Applets - Servlet Alternatives Servlet Architecture - Servlet Life Cycle – GenericServlet - HttpServlet - First Servlet - Passing Parameters to Servlets. **Java Server Pages**: Introduction and Marketplace - JSP and HTTP - JSP Engines - How JSP Works - JSP and Servlet - Anatomy of a JSP Page - JSP Syntax - JSP Components – Beans - Session Tracking - **Java Database Connectivity (JDBC):** Introduction - JDBC Drivers - JDBC Architecture - JDBC Classes and Interfaces - Basic Steps - Loading a Driver - Making a Connection - Execute SQL Statement - SQL Statements - Retrieving Result - Getting Database Information - Scrollable and Updatable ResultSet. **(12 Hours)**

BOOKFOR STUDY:

"Advanced Java Programming", Uttam K. Roy, Oxford University press, 2015

UNIT I : Chapters : 1,2,3,4

UNIT II : Chapters : 9,10,11

UNIT III : Chapters : 12, 13, 14

UNIT IV : Chapters : 16, 17, 18

UNIT V : Chapters : 19, 20, 21, 22

BOOKS FOR REFERENCE:

1. **"The Complete Reference Java",** Herbert Schild,Tata McGraw Hill Publishing Company Limited, Eleventh Edition, 2018.
2. **"Core Java Volume II"**, Cays Horstmann and Gary Cornell - Eleventh Edition, Pearson Education, 2019.
3. **"Core and Advanced Java Black Book",** Dr. R. NageswaraRao, Dreamtech Press, First Edition, 2018.

DIGITAL ELECRONICS AND COMPUTER ARCHITECTURE

Semester: I **Hours: 4**

Code : 20PCS1C02 **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Acquire knowledge of binary system and design the system to meet the required specifications.	PSO-1	K
CO-2	Simplify the Boolean functions in order to reduce the number of components in a circuit.	PSO-2	AP
CO-3	Design Sequential and Combinational logical Circuit	PSO-4	AP
CO-4	Understand the input/output organization and memory system of a computer.	PSO-3	U
CO-5	Classify the control logic design and micro computer system design.	PSO-5	E

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: I				**DIGITAL ELECRONICS AND COMPUTER ARCHITECTURE**							**Hours: 4**
Code : 20PCS1C02											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	3	3	3	3	3	3	4	3	3	3	4	3.27
CO-2	4	4	4	4	4	4	4	3	3	3	4	3.72
CO-3	3	3	3	3	3	3	4	3	3	3	4	3.27
CO-4	3	3	3	3	3	3	4	3	3	3	4	3.27
CO-5	3	3	3	3	3	3	4	3	3	3	4	3.27
Overall Mean Score												**3.36**

Result: The score for this course is **3.36** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Binary Systems: Digital Computers and Digital Systems – Binary Numbers – Number Base Conversions – Octal and Hexadecimal Numbers – Complements – Binary Codes – Binary Storage and Registers – Binary Logic – Integrated Circuits. **Boolean Algebra and Logic Gates:** Basic Definitions – Axiomatic Definition and Boolean Algebra – Basic Theorems and properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Other Logic Operations. **(12 Hours)**

UNIT II

Simplification of Boolean Functions: The Map Method – Two and Three Variable Maps – Four Variable Map – Five and Six Variable Map – Product of Sums Simplification – NAND and NOR Implementation – Don't care Conditions. **Combinational Logic:** Introduction – Design Procedure – Adders – Subtractors – Code Conversion – Analysis Procedure. **(12 Hours)**

UNIT III

Combinational Logic with MSI and LSI: Introduction – Binary Parallel Adder – Decimal Adder – Magnitude Comparator – Decoders – Multiplexers – Read-Only Memory (ROM) – Programmable Logic Array (PLA). **Sequential Logic:** Introduction – Flip-Flops – Triggering of Flip-Flops – Flip-Flop Excitation Tables – Design Procedure – Design of Counters – Design with State Equations. **(12 Hours)**

UNIT IV

Registers, Counters and the Memory Unit: Introduction – Registers – Shift Registers – Ripple Counters – Synchronous Counters – The Memory Unit. **Register Transfer Logic:** Introduction – Arithmetic, Logic and Shift Micro operations – Conditional Control Statements – Fixed Point Binary Data – Overflow – Arithmetic Shifts – Decimal Data – Floating Point Data - Nonnumeric Data – Instruction Codes. **(12 Hours)**

UNIT V

Control Logic Design: Introduction – Control Organization – Hard wired Control – Microprogram Control – Control of Processor Unit. **Micro Computer System Design:** Introduction – Microcomputer Organization – Microprocessor Organization – Instructions and Addressing Modes – Stack, Subroutines and Interrupt – Memory Organization – Direct Memory Access. **(12 Hours)**

BOOK FOR STUDY:

"Digital Logic and Computer Design", M. Morris Mano, Pearson Education, First Edition, 2016.

Unit I	**:**	Chapters : 1 (1.1 - 1.9), 2(2.1 -2.5)
Unit II	**:**	Chapters : 3(3.1 - 3.8), 4(4.1 - 4.6)
Unit III	**:**	Chapters : 5(5.1 - 5.8), 6(6.1 - 6.3), (6.6 - 6.9)
Unit IV	**:**	Chapters : 7(7.1 - 7.5, 7.7), 8(8.1 - 8.11)
Unit V	**:**	Chapters : 10(10.1-10.5), 12(12.1-12.8)

BOOKS FOR REFERENCE:

1. **"Digital Principles and Applications**", Donald P. Leach, Albert Paul Malvino, GoutamSaha, McGraw Hill Educations (India) Pvt. Limited, 8th Edition,2015.
2. **"Computer System Architecture",** M. Morris Mano, Pearson Education in South Asia, New Delhi, 3rd Edition, 2011.
3. **"Computer Organization and Design: The Hardware/Software Interface"** David A. Patterson, John L. Hennessy, Reed Elsevier India Pvt. Ltd., Haryana, 4thEdition, 2010.

DATA STRUCTURES AND ALGORITHMS

Semester: I **Hours: 4**

Code : 20PCS1C03 **Credits: 3**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Compare different programming methodologies, define asymptotic notations to analyze the performance of algorithms and calculate complexity.	PSO-1	K
CO-2	Use appropriate data structures such as arrays, linked list, stacks and queues to solve real world problems efficiently.	PSO-3	AP
CO-3	Represent and manipulate data using nonlinear data structures such as trees and graphs to design algorithms for various applications.	PSO-4	AN
CO-4	Illustrate and compare various techniques for searching and sorting.	PSO-2	AN
CO-5	Illustrate different dynamic programming techniques to solve the problems.	PSO-5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: I				**DATA STRUCTURES AND ALGORITHMS**							**Hours: 4**
Code : 20PCS1C03											**Credits: 3**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	3	3	3	3	3	3	4	3	3	2	4	3.09
CO-2	4	4	4	4	4	4	4	3	3	2	4	3.60
CO-3	3	3	3	3	3	3	4	3	3	2	4	3.09
CO-4	3	3	3	3	3	3	4	3	3	2	4	3.09
CO-5	3	3	3	3	3	3	4	3	3	2	4	3.09
Overall Mean Score												**3.19**

Result: The score for this course is **3.19** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

INTRODUCTION : Algorithm - Algorithm Specification**:** Pseudo code Conventions - Recursive Algorithms - Performance Analysis -Space Complexity - Time Complexity - Amortized complexity - Asymptotic Notation (O,Ω,θ) - Practical Complexities - Performance Measurement - **Randomized Algorithms:** Basics of Probability Theory - An Informal Description - Identifying the Repeated Element - Primality Testing - Advantages and Disadvantages. **(12 Hours)**

UNIT II

ELEMENTARY DATA STRUCTURES: Stacks and Queues **–** Trees -Terminology - Binary Trees - Dictionaries - Binary Search Trees - Priority Queues - Heaps - Heap Sort - Sets and Disjoint Set Union– Introduction - Union and Find operations - Graphs - Introduction - Definitions - Graph Representations. **Divide and Conquer:** General Method – Defective Chessboard - Binary Search - Finding the maximum and Minimum - Merge Sort - Quick Sort - Performance Measurement - Randomized Sorting Algorithms- Strassen's Matrix Multiplication. **(12 Hours)**

UNIT III

THE GREEDY METHOD: The General Method - The container Loading - Knapsack Problem - Tree Vertex Splitting - Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Prims Algorithm - Kruskals Algorithm-An Optimal Randomized Algorithm (*) - Optimal Storage on Tapes-Optimal Merge Patterns - Single Source Shortest Paths. **DYNAMIC PROGRAMMING:** The General method-All Pairs Shortest Paths-Optimal Binary Search Trees-The Traveling Sales Person Problem. **(12 Hours)**

UNIT IV

BASIC TRAVERSAL AND SEARCH TECHNIQUES: Techniques for Binary Trees, Techniques for Graphs - Breadth First Search and Traversal - Depth First Search and Traversal - Connected Components and Spanning Trees - Biconnected Components and DFS. **Back Tracking:** The General Method - The 8 Queens Problem - Sum of Subsets - Graph Coloring - Hamiltonian Cycles - Knapsack Problem. **(12 Hours)**

UNIT V

BRANCH AND BOUND: The Method - Least Cost (LC) Search -The 15-puzzle: An Example - Control Abstractions for LC Search - Bounding - FIFO Branch-and-Bound - LC Branch-And-Bound **0/1Knapsack Problem:** LC Branch – and - Bound Solution - FIFO Branch-and-Bound Solution - Traveling Sales Person(*) - Efficiency Considerations. **(12 Hours)**

BOOK FOR STUDY:

"Fundamentals of Computer Algorithms", Ellis Horowitz and SartajSahni and SangathevarRajesekaran, 2nd Edition, Universities Press (India) Private Limited, 2012.

Unit I : Chapter: 1 - 1.4

Unit II : Chapters : 2.1 - 2.6, 3.1 - 3.6, 3.8

Unit III : Chapters : 4.1 - 4.9, 5.1, 5.3, 5.5, 5.9

Unit IV : Chapters : 6.1 - 6.4, 7.1 - 7.6

Unit V : Chapter : 8.1 - 8.4

BOOKS FOR REFERENCE:

1. "**Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles"**, NarasimhaKarumanchi, 5th Edition, CareerMonk Publications, 2016.

2. "**Data Structures and Algorithms**", Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Pearson Education in South Asia, 2011.

DISCRETE MATHEMATICS

Semester: I **Hours: 4**

Code : 20PCS1C04 **Credits: 3**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Gain knowledge on set theory, operations and functions to construct mathematical arguments	PSO-1	K
CO-2	Learn formal methods of symbolic propositional logic to compute normal forms.	PSO-1, 2	AP
CO-3	Compute permutations and combinations of a set and interpret the meaning.	PSO-3	C
CO-4	Explain Boolean Algebra and algebraic systems.	PSO-2, 4	AN
CO-5	Interpret the application of graph theory to solve real world problems.	PSO-5	S

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: I				**DISCRETE MATHEMATICS**								**Hours: 4**
Code : 20PCS1C04												**Credits: 3**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	3	3	3	3	3	3	4	4	3	2	4	3.18
CO-2	4	4	4	4	4	4	4	4	3	3	4	3.82
CO-3	3	3	3	3	3	3	4	4	3	2	4	3.18
CO-4	4	2	3	2	3	3	4	4	3	2	4	3.09
CO-5	3	3	3	3	3	3	4	4	3	3	4	3.27
Overall Mean Score												**3.31**

Result: The score for this course is **3.31** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Set Theory: Introduction – Sets – Some standard sets – Subset and Proper Subset – Equality of sets – Power set - Venn Diagram - Operations on sets – Some other classes of sets. **Function:** Definitions of functions – Types of functions – Composition of functions – Sum and Product of functions – functions used in computer science. **(12 Hours)**

UNIT II

Propositional Logic: Introduction to propositional Logic – Proposition – Logical operations – Tautology – Contradiction – Logical equivalence – Normal forms – Predicates – Methods of Proof. **(12 Hours)**

UNIT III

Combinatorics: Induction – Basic counting principle – Permutations and combinations Generalized permutation and combination - Pigeonhole principle. **Recurrence Relations:**Introduction – Recursive definition – Recurrence relation – Solution of recurrence relations – Linear recurrence relation with coefficients.

(12 Hours)

UNIT IV

Algebraic structure: Introduction –Binary operations – Subgroups – Permutations and symmetric group – Cyclic group – Ring – Field – Polynomial Ring.**BooleanAlgebra:**Introduction – Partial ordering – Totally ordered set – Dual order –Well-ordered set – Lattices – Some Properties of Lattices – Direct product – Boolean algebra – Sub Boolean algebra – Direct products. **(12 Hours)**

UNIT V

Automata Theory: Finite automata – Regular expression – Regular expression and finite automata. **(12 Hours)**

BOOKS FOR STUDY:

1. **"Discrete Mathematics",** R.K.Bisht and H.S Dhami, Oxford University Press FirstEdition, 2015.

Unit I **:** Chapters : 2(2.1 – 2.9), 4(4.1, 4.2, 4.4 – 4.7)
Unit II **:** Chapter : 1(1.2 – 1.7, 1.11, 1.13, & 1.16)
Unit III **:** Chapters : 6(6.1 – 6.4 & 6.7), 9(9.1- 9.4, 9.6, 9.7)
Unit IV **:** Chapter : 10(10.1, 10.2, 10.4 – 10.6,10.11,10.14& 10.15)
Unit V **:** Chapter : 12(12.5, 12.7 & 12.8)

2. **"Operations Research an Introduction",** Hamdy A. Taha, Pearson education, 6th edition, 1997.

Unit IV **:** Chapter : 6(6.7.1 – 6.7.3)

3. **"Discrete Mathematics Structure",** G.ShankerRao, New Age International Publishers, 2013.

Unit IV **:** Chapter : 5(5.1 – 5.4,5.11,5.16 – 5.24)

BOOKS FOR REFERENCE:

1. **"Discrete Mathematics and its Applications",** KennenthRosen, 7th edition, McGraw Hill publication, 2017.
2. **"A Text Book of Discrete Mathematics",**Swapan Kumar Sarker, 9th edition, S. Chand Publication, 2016.

DISTRIBUTED OPERATING SYSTEM

Semester: I **Hours: 6**
Code : 20PCS1E1A **Credits: 4**
COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Describe the fundamental concepts of Distributed operating system.	PSO-1	K
CO-2	Analyse synchronization and deadlock in operating system and the methods to manage / avoid and implement them in multi-threaded programming system.	PSO-1	AN
CO-3	Explain the concepts of process, process scheduling and threads in Distributed Operating System.	PSO-4	U
CO-4	Compare different types of File System and Distributed Shared Memory in Operating Systems.	PSO-4	AN
CO-5	Discuss the mechanism for message passing and Remote Procedure Call (RPC).	PSO-5	S

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: I				**DISTRIBUTED OPERATING SYSTEM**							**Hours: 6**
Code : 20PCS1E1A											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	3	3	3	3	3	3	4	3	3	3	4	3.27
CO-2	3	3	3	3	3	3	4	3	3	3	4	3.18
CO-3	3	3	3	3	3	3	4	3	3	3	4	3.27
CO-4	3	3	3	3	3	3	4	3	3	3	4	3.27
CO-5	3	3	3	3	3	3	4	3	3	3	4	3.27
Overall Mean Score												**3.25**

Result: The score for this course is **3.25** (High Relationship)
Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

Introduction to Distributed Systems: What is a Distributed System - Goals - Hardware Concepts - Software concepts - Design issues - **Communication in Distributed Systems:** Layered Protocols - ATM networks - The Client–Server model - Remote Procedure call - Group Communication. **(18 Hours)**

UNIT II

Synchronization in Distributed System: Clock Synchronization - Mutual Exclusion - Election Algorithms - Atomic Transactions - Deadlocks in Distributed Systems. **Process and processors in Distributed System:** Threads - System Models - Processor Allocation - Scheduling in Distributed System - Fault Tolerance - Real time Distributed System. **(18 Hours)**

UNIT III

Distributed File Systems: Distributed File System Design - Distributed File System Implementation - Trends in Distributed File System- **Distributed Shared Memory**: Introduction, What is Shared memory - Consistency models - Page based Distributed Shared memory - Shared – Variable Distributed Shared memory - Object based Distributed Shared Memory. **(18 Hours)**

UNIT IV

Message Passing: Introduction - Desirable Features of a Good Message-Passing System - Encoding and Decoding of Message Data - Process Addressing - Failure Handling – Group Communication. **Remote Procedure Call:** Introduction – The RPC Model - Implementing RPC Mechanism - Stub Generation -RPC Messages - Server Management – Call Semantics - Communication Protocols for RPC's - Client-Server Binding - Special Types of RPC - Lightweight RPC. **(18 Hours)**

UNIT V

Naming: Introduction – Desirable Features of a Good Naming System – Fundamental Terminologies and Concepts – System Oriented Names – Object-Location Mechanisms – Human-Oriented Names – Name Caches – Naming and Security. **Security:** Introduction – Potential Attacks to Computer Systems – Cryptography – Authentication – Access Control – Digital Signatures – Design Principles. (**18 Hours)**

BOOKS FOR STUDY:

1. "**Distributed Operating Systems**", Andrew S. Tanenbaum, Pearson Education,1st Edition, 2012.

UNIT I : Chapters : 1 (1.1 - 1.5), 2 (2.1 - 2.5)

UNIT II : Chapters: 3 (3.1 - 3.5), 4 (4.1 - 4.6)

UNIT III : Chapters : 5 (5.1 - 5.3), 6(6.1 - 6.6)

2. "**Distributed Operating System Concepts and Design**", Pradeep K. Sinha, PHI Private Ltd, 1st Edition, 2008.

UNIT IV : Chapters:3(3.1,3.2,3.7-3.10),4(4.1,4.2,4.4- 4.6,4.8,4.10,4.11,4.13,4.16,4.18)

UNIT V : Chapters: 10 (10.1-10.8), 11(11.1-11.7)

BOOKS FOR REFERENCE:

1. **"Distributed Systems Concepts and Design**", George Coulouris, Jean Dollimore and Tim Kindberg, Fifth Edition, Pearson Education, 2017.
2. **"Distributed Computing"**, SunithaMahajan, Seema Shah, Second Edition, Oxford University Press, 2014.

HUMAN COMPUTING INTERACTION

Semester: I **Hours: 6**

Code : 20PCS1E1B **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Outline the basic concept of Human Computer Interfacing.	PSO -1	K
CO-2	Discuss User-Centric and Computational Models.	PSO-2	U
CO-3	Identify the issues and challenges in HCI, including the importance of human factor.	PSO-3	K
CO-4	Describe latest research focus in the area of User-Centric Computing.	PSO-3	U
CO-5	Analyze the importance of various prototyping approaches for interactive design.	PSO-5	AN

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: I				**HUMAN COMPUTING INTERACTION**							**Hours: 6**
Code : 20PCS1E1B											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	4	4	2	4	3	4	3	4	4	3	3.55
CO-2	4	5	4	3	3	4	4	4	4	3	2	3.64
CO-3	4	4	3	2	3	3	4	3	4	3	4	3.36
CO-4	3	3	3	2	3	2	4	4	4	5	5	3.45
CO-5	3	3	3	2	2	3	4	4	4	3	4	3.18
Overall Mean Score												**3.44**

Result: The score for this course is **3.44** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Introduction: Learning Objectives – Introduction – User-Centric Design – What and Why – Genesis of the Field – Issues and Challenges – Research Trends. **User-Centric: An Engineering Perspective:** Introduction – Engineering a Software System – Introduction to Usability – User-Centric Design – Case Studies.

(18 Hours)

UNIT II

User-Centric: A Computational Perspective: Introduction – A Framework for User-Centric Computing – User-Centric Models – Models for User-Centric Computing – Broad Taxonomy of User-Centric Computing Models. **Computational Models of Users-Classic Models:** Introduction – The GOMS Models – Models of Specific User Behaviour – The Models and the Computational Framework. **(18 Hours)**

UNIT III

Computational Models of Users – Contemporary Interfaces and Interactions: Introduction – WIMP Interactions: 2D Pointing and Scrolling – Constrained Navigations on Interfaces – Mobile Typing – Touch Interaction. **Computational Models of Users – Design Implications and Present State:** Introduction – Design Case Study: Virtual Keyboard – Models for Non-Traditional Interactions – Learning-based Models – Emerging Trend in Interactive Systems. **(18 Hours)**

UNIT IV

Empirical *Research* for User-Centric Computing: Introduction – Research Questions – Identification of Variables – Experiment Design – Data Analysis – Use of Empirical Data for Model Building. **Formal Models in User-Centric Computing:** Introduction – User-Centric Computing with Matrix Algebra – Use of Formal Models and Issues – Formal Modelling of Dialog – Other Format Models and Trends – An Overview. **(18 Hours)**

UNIT V

User- Centric Computing for Evaluation: Introduction – Evaluation with Experts – Evaluation with Users – Model-Based Evaluation – A Framework for Usability Evaluation and Design. **User-Centric Computing Beyond GUI: Ubiquitous Systems:** Introduction – Research Trends: GUI and Beyond – Use-Centric Issues and Challenges - Enabling Technologies – User-Centric Computing Challenges.

(18 Hours)

BOOK FOR STUDY:

"Human-Computer Interaction: User-Centric Computer Design", Samit Bhattacharya, Mc-GrawHill Education, 2nd Edition, 2020.

UNIT I : Chapters 1, 2

UNIT II : Chapters 3, 4

UNIT III : Chapters 5, 6

UNIT IV : Chapters 7,8

UNIT V : Chapters 9, 10

BOOKS FOR REFERENCE:

1. **"Designing the User Interface: Strategies for Effective Human- Computer Interaction",** Shneiderman, 5th Edition, Pearson Edition, 2014.
2. "**Galitz's Human Machine Interaction",** Dhananjay R. Kalbande, PrashantKande, Wiley Edition, 2015.

INFORMATION SECURITY AND CYBER LAW

Semester: I **Hours: 6**

Code : 20PCS1E1C **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Understand the basics of information system and security	PSO-1	K
CO-2	Describe cryptanalysis and comprehend code breaking methodologies	PSO-1,2	C
CO-3	Analyze and evaluate security threats and protect data from destruction, modification and theft.	PSO-2,5	E
CO-4	Use cyber security information assurance software tools	PSO-2	AP
CO-5	Design operational and strategic cyber security policies for an organization.	PSO-4,5	S

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: I				**INFORMATION SECURITY AND CYBER LAW**							**Hours: 6**
Code : 20PCS1E1C											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	3	3	2	4	3	5	3	3	3	4	3.36
CO-2	4	4	3	3	3	4	4	4	3	3	3	3.45
CO-3	5	3	3	3	4	5	3	5	3	4	4	3.82
CO-4	3	3	3	3	3	4	3	4	3	3	4	3.27
CO-5	5	3	4	3	4	4	3	4	3	4	4	3.73
Overall Mean Score												**3.53**

Result: The score for this course is **3.53** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Introduction to Information Systems and Security: Information Systems – Computer Literacy and IS Literacy – IS Components – Trends in IS – IS and Business Organization – IS Failures and Causes. **Types of IS:** Operations Support Systems – Management Support Systems – Knowledge Based Systems. **Development of IS:** Waterfall Model – Prototyping Model – Evolutionary Model – Spiral Model – Incremental Model. **(18 Hours)**

UNIT II

Introduction to Information Security: Role of Security in Internet and Web Services – Securing Web Services – **Need for Information Security:** Benefits of ISMS – Security Implications for Organizations – Monitoring the Network – Understanding Intrusion Detection Systems – Threats to Information Systems – Information Assurance. **Cyber Security:** Viruse, Phishing and Identity Theft – Protection for Applications and Individual Privacy – Protection from Online Predators and Cyberbullies - Security Risk Analysis. **(18 Hours)**

UNIT III

Introduction to Application Security and Counter Measures: Introduction to Application Security - Vender Challenges for Application Security – User Challenges for Application Security. **Data Security Considerations:** Data Backup Security Considerations – Data Disposal Security Considerations – Security Technologies – Firewalls – VPN – Intrusion Monitoring and Detection – Understanding Access Control. **Security Threats:** Viruses – Trojan Horses – Logic Bombs – Worms – Antivirus Software – Spoofing – Trapdoor – E-mail Virus – Macro Virus – Malicious Software – Denial of Service Attacks – Security Threats to E-Commerce – E-Cash and Electronic Payment Systems – Credit/Debit/Smart Cards. **(18 Hours)**

UNIT IV

Digital Signature: Requirements of Digital Signature System – Components of Digital Signature – Technical Issues – Legal Issues. **Cryptography and Encryption:** Private Key Encryption – Public Key Encryption – Understanding Cryptanalysis – Describing Code Breaking Methodologies – Describing Cryptographic Attacks. **Introduction to Security Measures:** Secure Information System Development – Integrating Security at the Initial Phase - Integrating Security at the Development Phase - Integrating Security at the Implementation Phase - Integrating Security at the Maintenance Phase - Integrating Security at the Disposal Phase. Application Development Security – Information Security Governance and Risk Management. (**18 Hours)**

UNIT V

Security Architecture and Design: Secure System Design – Secure Hardware System Architecture – Secure Operating System and Software Architecture. Security Issues in Hardware.Data Storage and Downloadable Devices – Physical Security of IT Assets – Backup Security Measures.**Introduction to Security Policies and Cyber Laws:** Need for an Information Security Policy – Information Security Standards-ISO – Introducing Various Security Policies and Their Review Process – WWW Policy – E-mail Security Policy – Corporate Policy – Sample Security Policy – Policy Review Process – Introduction to Indian Cyber Law – Objective and Scope of the IT Act, 2000 – Intellectual Property Issues – Overview of Intellectual-Property-Related Legislation in India – Patent - Copyright – Law Related to Semiconductor Layout and Design – Software License. **(18 Hours)**

BOOK FOR STUDY:

"Introduction to Information Security and Cyber Laws", Surya PrakashTripathi, RitendraGoel, Praveen Kumar Shukla, Kogent Learning Solutions Inc., Dreamtech Press, 2014.

Unit I **:**Chapter : 1(1.1-1.3)

Unit II **:**Chapter : 1(1.4-1.9)

Unit III **:**Chapter : 2 (2.1-2.7)

Unit IV **:**Chapters : 2 (2.8,2.9), 3(3.1-3.3)

Unit V **:** Chapters : 3 (3.4-3.7), 4(4.1-4.11)

BOOKS FOR REFERENCE:

1. **"Cryptography and Information Security",** V.K. Pachghare, Second Edition, PHI, 2015.
2. **"Cryptography and Network Security- Principles and Practice",** William Stallings, Seventh Edition, Pearson Education, 2017.

ADVANCED JAVA PROGRAMMING - LAB

Semester: I **Hours: 5**

Code : 20PCS1P01 **Credits: 3**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Experiment the fundamental concepts and features of Java Programming language.	PSO-1	K
CO-2	Demonstrate the Internet Programming using Java Applets	PSO-2	AP
CO-3	Apply event handling on AWT and Swing components.	PSO-4	AP
CO-4	Invoke the remote methods in an application using Remote Method Invocation (RMI)Method.	PSO-3	S
CO-5	Create dynamic web pages using Servlets and JSP and access database through Java programs using Java Data Base Connectivity (JDBC)	PSO-5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: I				**ADVANCED JAVA PROGRAMMING - LAB**							**Hours: 5**
Code : 20PCS1P01											**Credits: 3**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	3	3	3	3	3	3	4	4	4	4	4	3.45
CO-2	3	3	3	3	3	3	4	4	3	3	3	3.18
CO-3	3	3	3	3	3	3	4	4	4	4	4	3.45
CO-4	3	3	3	3	3	3	4	4	4	4	4	3.45
CO-5	4	4	4	4	4	4	3	3	3	4	4	3.72
Overall Mean Score												**3.45**

Result: The score for this course is **3.45** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

1. Simple programs using Classes and Objects.
2. Programs to perform different types of Inheritance.
3. Programs for creating packages.
4. Programs for creating Thread.
5. Exception handling using predefined exception.
6. JDBC programs for inserting, updating, deleting & selecting data using simple, prepared callable statements
7. Basic servlet program
8. Session management in JSP.
9. Implementing basic scriptingelements of JSP.
10. Creating a Java Bean and calling beans using JSP
11. Implementing various event handling mechanisms using AWT.
12. Generate graphics using java applets.
13. Display images using java applets.
14. Database operations using Swings.
15. Program on Stock Market Using RMI.
16. Application Development using RMI.

DIGITAL ELECTRONICS - LAB

Semester: I **Hours: 3**

Code : 20PCS1P02 **Credits: 2**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Implement and verify the Boolean function using logic gates.	PSO-1	K
CO-2	Construct the basic combinational circuits and verify them.	PSO-3	C
CO-3	Design Adder and Subtractor using Logic Gates	PSO-4	AP
CO-4	Apply the design procedure to design basic sequential circuits	PSO-2	AP
CO-5	Analyze and design digital circuits using Flip-Flops, Registers and counters	PSO-5	AN

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: I				**DIGITAL ELECTRONICS - LAB**							**Hours: 3**
Code : 20PCS1P02											**Credits: 2**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	3	3	3	3	3	3	4	3	3	3	3	3.09
CO-2	3	3	3	3	3	3	4	4	3	3	3	3.18
CO-3	3	3	3	3	3	3	4	3	3	3	3	3.09
CO-4	3	3	3	3	3	3	3	3	3	3	3	3.00
CO-5	4	4	4	4	4	4	3	3	3	3	3	3.54
Overall Mean Score												**3.18**

Result: The score for this course is **3.18** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

1. Implementation of the Boolean function using logic gates.

2. Design and verify Half Adder.

3. Design and verify Full Adder and Subtractor.

4. Verification of State Tables of J-K, R-S and D Flip Flops.

5. Implementation of Multiplexer and Demultiplexer using Logic Gates.

6. Magnitude Comparator.

7. Design Shift Register.

   a) Serial in - Serial Out

   b) Serial in - Parallel Out

8. Design Synchronous Counter.

MOBILE APPLICATION DEVELOPMENT

Semester: II **Hours: 4**

Code : 20PCS2C05 **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Acquire the necessary Java fundamentals for Android Application Development.	PSO – 1,2	K
CO-2	Explore and implement programs for handling pictures and menus with views.	PSO-1,2	C
CO-3	Design and develop Android application for emailing and networking in Android.	PSO – 2,4	C
CO-4	Developing Android app using graphics and animations.	PSO -1,2	AN
CO-5	Demonstrate the basics of Wi-Fi technologies.	PSO -2,5	AN

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II				**MOBILE APPLICATION DEVELOPMENT**							**Hours: 4**
Code : 20PCS2C05											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	3	3	2	4	3	5	3	3	3	4	3.36
CO-2	4	4	3	3	3	4	4	4	3	3	3	3.45
CO-3	5	3	3	3	4	5	3	5	3	4	4	3.82
CO-4	3	3	3	3	3	4	3	4	3	3	4	3.27
CO-5	5	3	4	3	4	4	3	4	3	4	4	3.73
Overall Mean Score												**3.53**

Result: The score for this course is **3.53** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Fundamentals of Java for Android Application Development - Getting an Overview of Android - Using Activities, Fragments, and Intents in Android.

(12 hours)

UNIT II

Working with the User Interface Using Views and ViewGroups - Handling Pictures and Menus with Views. **(12 hours)**

UNIT III

Storing the Data Persistently - Emailing and Networking in Android. **(12 hours)**

UNIT IV

Working with Location Services and Maps - Working with Graphics and Animation - Audio, Video, and Camera. **(12 hours)**

UNIT V

Threads and Services - Bluetooth, NFC, and Wi-Fi - Telephony and SMS.**(12 hours)**

BOOK FOR STUDY:

1. **"Android Application Development (with KitKat Support) Black Book",** Pradeep Kothari &KogentLearing Solutions Inc., Dreamtech Press, Edition 2014.

   Unit I : Chapters 1,2,3

   Unit II : Chapters 4,5

   Unit III: Chapters 6,7

   Unit IV: Chapters 8,9,10

   Unit V : Chapters 11,12,13

BOOKS FOR REFERENCE:

1. **"Android Programming",** B.M. Harwani, PEARSON, First Edition, 2013.
2. **"Advanced Android Application Development",** Joseph Annuzzi, Jr. Lauren Darcey, Shane Conder'', Pearson, Fourth Edition, 2015.
3. **"Professional Android 2 Application Development",** Reto Meier, Wrox Wiley, 2010.

MICROPROCESSOR AND MICROCONTROLLER

Semester: II **Hours: 4**

Code : 20PCS2C06 **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Discuss machine level programs and programming with assembler.	PSO – 1	K
CO-2	Analyze the architecture and develop low level programs on the microprocessor 8086.	PSO-4	AN
CO-3	Evaluate the techniques for faster execution of instruction and enhance the performances of microprocessor	PSO – 2,4	E
CO-4	Elucidate memory interfacing and its impact on computer organization.	PSO -1,5	U
CO-5	Analyze the architecture of microcontroller	PSO -2,5	AN

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II			**MICROPROCESSOR AND MICROCONTROLLER**						**Hours: 4**			
Code : 20PCS2C06												**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	5	3	4	3	3	4	4	3	4	3	3.64
CO-2	4	5	3	4	3	4	4	4	3	4	3	3.73
CO-3	4	4	3	3	3	3	4	4	3	3	4	3.45
CO-4	4	3	3	3	3	3	4	3	3	4	3	3.27
CO-5	4	3	3	4	3	3	4	3	4	3	3	3.36
Overall Mean Score												**3.49**

Result: The score for this course is **3.49** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

The Processors: 8086/8088 - Architectures, PinDiagrams and Timing Diagrams: Register organization of 8086 - Architecture- Signal description of 8086 - Minimum mode 8086 system and timings - Maximum mode 8086 System and Timings – **8086/8088 Instruction Set and Assembler Directives:** Machine Language Instruction format - Addressing modes of 8086 - Instruction set of 8086 - Assembler directives and operators. **(12 Hours)**

UNIT II

The Art of Assembly Language Programming with 8086/8088: A few machine level programs - Machine coding the programs - Programming with an assembler. **Special Architectural Features and Related Programming:** Introduction to stack - STACK structure of 8086 - Interrupts and Interrupt Service Routines.

(12 Hours)

UNIT III

Basic Peripherals and their interfacing with 8086/88: Interfacing I/O Ports -PIO 8255 [Programmable Input-Output Port] – Modes of Operation of 8255 – Stepper motor Interfacing. **DMA & High Storage Capacity Memory Devices:** DMA Controller 8257 – DMA Transfer and Operations – Programmable DMA Interface 8257. **(12 Hours)**

UNIT IV

80286-80287--- A Microprocessor with Memory Management and Protection: Salient features of 80286 - Internal Architecture of 80286 - Signal descriptions of 80286 – Real addressing mode - Protected Virtual Addressing Mode (PVAM) - Privilege – Protection. **Recent Advances in Microprocessor Architectures - A Journey from Pentium Onwards**: Salient features of 80586 (PENTIUM) - A few relevant concepts of computer architecture – System architecture – Branch Prediction - Enhanced Instruction set of Pentium –What is MMX - Intel MMX Architecture – MMX Data Types - MMX Instruction set. **(12 Hours)**

UNIT V

An Introduction to Architecture and Programming 8051 and 80196: Architecture of 8051 - Signal Description of 8051 - Register set of 8051 - Important operational features of 8051 - Memory and I/O Addressing by 8051 - Interrupts and Stack of 8051 – Addressing modes of 8051 - 8051 Instruction set. -INTEL'S 16 BIT MICROCONTROLLER FAMILY MCS -96. **CASE STUDY**: Analyze and report the basic Instructions with microprocessor Motrolla's 68600 **(12 Hours)**

BOOK FOR STUDY:

1. "**Advanced Microprocessor and Peripherals**", A.K. Ray and Bhurchandi Tata McGraw - Hill Publications, 2006.

   Unit I : Chapters : 1(1.1-1.3, 1.8 -1.9), 2(2.1- 2.4)

   Unit II : Chapters : 3(3.1- 3.3), 4(4.1- 4.3)

   Unit III: Chapters : 5(5.3-5.5, 5.8), 7(7.1-7.3)

   Unit IV: Chapters : 9(9.1-9.7), 11(11.1 - 11.8, 11.10)

   Unit V : Chapter: 17(17.2 - 17.9, 17.11)

BOOKS FOR REFERENCE:

1. **"Digital Computer Electronics"** Albert Paul Malvino and Jerald A. Brown, McGraw – Hill Publications, 3rd Edition, 2017.
2. "**Programming and Customizing the 8051 Microcontroller**", MykePredko, Tata McGraw - Hill Publication, 1999.
3. "**Microprocessors and Interfacing Programming and Hardware**", Douglas V. Hall, Tata McGraw - Hill Publishing Company Limited, Second Edition, 1991, Reprint 2004

SOFTWARE ENGINEERING

Semester: II **Hours: 4**
Code : 20PCS2C07 **Credits: 3**
COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Define various software application domains with different process models used in software development.	PSO – 1,	K
CO-2	Elucidate the need for software specifications and requirements with their gathering techniques.	PSO-4	C
CO-3	Convert requirements model into design model and demonstrate software and user interface design principles.	PSO – 2,4	AN
CO-4	Classify testing strategies and tactics and compare them.	PSO -1,5	C
CO-5	Generate project schedule and construct, design and develop network diagram for different type of Projects.	PSO -2,5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II				**SOFTWARE ENGINEERING**							**Hours: 4**
Code : 20PCS2C07											**Credits: 3**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	3	3	3	3	4	5	4	3	3	3	3.45
CO-2	4	3	4	3	3	3	3	3	3	5	3	3.36
CO-3	3	3	3	4	3	4	3	4	3	4	3	3.36
CO-4	3	3	3	3	3	3	4	3	3	3	4	3.18
CO-5	4	3	3	4	3	5	4	4	4	4	5	3.91
Overall Mean Score												**3.45**

Result: The score for this course is **3.45** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Software and Software Engineering: TheNature of Software – The Unique Nature of WebApps – Software Engineering - The Software Process - Software Engineering Practice – Software Myths. **THE SOFTWARE PROCESS: Process Models:** A Generic process Model – Process Assessment and improvement - Prescriptive process Models – Specialized Process Models- Unified process - personal and team process models. **(12 Hours)**

UNIT II

MODELING: Principles that Guide Practice: Software Engineering Knowledge – Core Principles – Principles that guide Each Framework Activity - **Understanding Requirements:** Requirements engineering - Establishing the Groundwork – Eliciting Requirements – Developing Use Cases. **REQUIREMENTS MODELING: Scenarios, Information, and Analysis Classes:** Requirements Analysis- Scenario-Based Modeling - UML Models that supplement that use case – Data Modeling Concepts – Class-Based Modeling. **(12 Hours)**

UNIT III

Design Concepts: Design with the Context of software Engineering – The Design Process – Design Concepts – The design Model. **Architectural Design:** Software Architecture- Architecture Genres – Architecture Styles - Architecture Design. **QUALITY MANAGEMENT: Quality Concepts**: What is quality – Software Quality –The Software Quality Dilemma – Achieving Software Quality. **(12 Hours)**

UNIT IV

Software Testing Strategies – A Strategic Approach to Software Testing - Strategic Issues – Test Strategies for Conventional Software – Validation Testing – System Testing.**Testing Conventional Applications:** Software Testing Fundamentals – Internal and External Views of Testing – White Box Testing – Basis Path Testing – Control Structure Testing - Black Box Testing. **(12 Hours)**

UNIT V

MANAGING SOFTWARE PRODUCTS: Project Management Concepts: The Management Spectrum – People – The Product –The Process – The Project – The W5HH Principle. **Project Scheduling:** Basic Concepts - Project Scheduling – Scheduling. **Risk Management:** Reactive versus Proactive Risk Strategies - software Risks – Risk Identification - Risk Projection – Risk Refinement – Risk Mitigation, Monitoring and Management – The RMMM Plan. **(12 Hours)**

BOOK FOR STUDY:

"**Software Engineering a Practitioners Approach",** Roger S. Pressman, McGraw – Hill International Edition, Eighth Edition, 2019

Unit I	**:** Chapters	:	1.1 – 1.6, 2.1 – 2.6
Unit II	**:** Chapters	:	4.1 – 4.3, 5.1 – 5.3, 6.1- 6.5
Unit III	**:** Chapters	:	8.1 – 8.4, 9.1 – 9.4, 14.1 – 14.4
Unit IV	**:** Chapters	:	17.1 -17.3, 17.6-17.7, 18.1 – 18.6
Unit V	**:** Chapters	:	24.1 - 24.7, 27.1 – 27.2, 27.5, 28.1 -28.5

BOOKS FOR REFERENCE:

1. **"Software Engineering Concepts",** Richard Fairley, TATAMcGraw – Hill Edition 2008.
2. "**Software Engineering**", Ian Sommerville, Pearson Education, Tenth Edition, 2016.

DATA SCIENCE USING R

Semester: II **Hours: 4**

Code : 20PCS2GE1 **Credits: 3**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Discuss the basic concepts of R programming language such as variables, data types, functions and installation procedures.	PSO-1	K
CO-2	Explore the methods to read data and basic functions to work on data.	PSO-1	U
CO-3	Apply the control statements and loops to solve different problems.	PSO-1,2	AP
CO-4	Use basic statistical concepts for data analysis.	PSO-3,5	AP
CO-5	Evaluate data sets using nonlinear models, correlation and clustering.	PSO-3,5	E

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II				**DATA SCIENCE USING R**							**Hours: 4**
Code : 20PCS2GE1											**Credits: 3**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	3	3	3	3	3	4	4	3	3	4	3.36
CO-2	4	3	3	4	3	3	4	3	3	3	3	3.32
CO-3	3	3	4	4	3	3	4	4	3	3	3	3.36
CO-4	3	5	4	3	4	3	4	5	3	3	3	3.64
CO-5	4	5	4	3	5	3	3	4	4	3	4	3.82
Overall Mean Score												**3.5**

Result: The score for this course is **3.5** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I:

Getting R: Downloading R- R Version-32-bit versus 64 –bit- Installing – Revolution R Community Edition- **The R Environment: -** Command Line Interface- RStudio- Revolution analytics RPE- **R Packages:** Installing Packages Loading Packages- Building a packages- **Basics of R:** Basic Math- Variables –data types – Vectors- Calling Functions- Function Documentation- Missing data. **(12 Hours)**

UNIT II:

Advanced Data Structures: Dataframes-Lists- Matrices-Arrays**. Reading Data into R:** Reading CSVs-Excel data-Reading from databases-Data from other Statistical Tools- R Binary Files- Data included with R- Extract Data from Web Sites. **Statistical Graphics:** Base Graphics- ggplot2.**Writng R Functions:** Hello, world!- Function Arguments- Return Values – do..call **(12 Hours)**

UNIT III:

Control Statements: if and else- switch- ifelse – Compound Tests. **Loops, the Un –R Way to Iterate:** for loops – while loops- controlling loops. **Manipulating Strings:** paste – sprint – Extracting Text – Regular Expressions- **Probability Distributions**: – Normal Distributions- Binomial distributions- Poisson Distributions – Other Distributions. **(12 Hours)**

UNIT IV

Basic Statistics: Summary Statistics – Correlation covariance- T- Tests- ANOVA. **Linear Models:** Simple Linear Regression- Multiple Regression. **Generalized Linear Models:** Logistic Regression – Poisson Regression – Other Generalized Linear Models – Survival Analysis. **(12 Hours)**

UNIT V

Nonlinear Models: Nonlinear Least Squares – Splines – Generalized Additive Models – Decision Trees – Random Forests. **Time Series and Auto Correlation:** Autoregressive Moving Average – VAR – GARCH.**Clustering:** K-means – PAM – Hierarchical Clustering. **(12 Hours)**

BOOK FOR STUDY:

"R for Everyone Advanced Analytics and Graphics", Jared P. Lander, Pearson Education, 2015.

Unit I :	Chapters	: 1-4
Unit II :	Chapters	: 5-8
Unit III:	Chapters	: 9,10, 13,14
Unit IV:	Chapters	: 15 - 17
Unit V :	Chapters	: 20 - 22

BOOKS FOR REFERENCE:

1. **"Big Data Analytics Made Easy",** Y. Lakshmi Prasad, Notion Press, 2016
2. **"Data Analysis and Graphics Using R– an Example-Based Approach**'', John Maindonald& W. John Braun Third Edition, Cambridge University Press, 2010

MOBILE COMPUTING

Semester: II **Hours: 6**

Code : 20PCS2E2A **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Find more on the concepts and features of mobile computing technologies and applications.	PSO-1	U
CO-2	Describe the functionalities and components of emerging technologies, global system for mobile communication and short message services.	PSO-1,4	K
CO-3	Demonstrate the general packet radio services and underlying wireless application protocols such as WAP, MMS and GPRS.	PSO-1,4	C
CO-4	Compare CDMA, 3G, wireless LAN and mobile communication networks and their technical features.	PSO-5	E
CO-5	Analyze and recognize the working principles of wireless devices with SYMBIAN OS and security issues in mobile computing.	PSO-1,5	AN

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II				**MOBILE COMPUTING**							**Hours: 6**
Code : 20PCS2E2A											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	3	3	3	3	3	4	3	3	4	4	3.36
CO-2	4	3	3	3	3	3	4	4	3	3	3	3.18
CO-3	4	3	3	3	3	3	4	3	3	3	3	3.18
CO-4	4	3	3	3	3	3	4	3	3	3	4	3.27
CO-5	4	3	3	4	4	4	4	3	3	3	3	3.45
Overall Mean Score												**3.29**

Result: The score for this course is **3.29** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

Introduction: Mobile Computing- Dialogue Control - Networks - Middleware and gateways - Developing Mobile Computing Applications - Security in Mobile Computing - **Mobile computing Architecture:** Architecture for mobile computing - Three-Tier Architecture - Design considerations for mobile computing. **Mobile computing Through Telephony:** Evolution of telephony - Multiple Access Procedures - Satellite Communication Systems - Mobile Computing through Telephone - Developing an IVR Application - Voice XML - Telephony Application Programming Interface (TAPI) - Computer Supported Telecommunications Applications. **(18 Hours)**

UNIT II

EmergingTechnologies: Introduction - Bluetooth-RadioFrequency Identification-Wireless Broadband - Mobile IP- Internet Protocol Version 6 (IPV6) - Java Card. **Global System for Mobile Communication:** Global System for Mobile Communications - GSM Architecture - GSM Entities - Call Routing in GSM - PLMN Interface - GSM Addresses and Identifiers - Network Aspects in GSM - GSM Frequency Allocation - Authentication and Security. **Short Message Service:** Mobile computing over SMS - Short Message Services - Value Added Services through SMS - Accessing the SMS Bearer**.** **(18 Hours)**

UNIT III

General Packet Radio Service: Introduction - GPRS and Packet Data Network - GPRS Network Architecture - GPRS Network Operations - Data Services in GPRS - Applications for GPRS - Limitations of GPRS. **Billing and Charging in GPRS Wireless Application Protocol:** Introduction - WAP - MMS - GPRS Applications.

(18 Hours)

UNIT IV

CDMA and 3G: Introduction - Spread - Spectrum Technology - Is-95 - CDMA versus GSM - Wireless Data - Third Generation Networks - Applications on 3G. **Wireless LAN:** Introduction - Wireless LAN Advantages - IEEE 802.11 Standards - Wireless LAN Architecture - Mobility in Wireless LAN - Deploying Wireless LAN - Mobile Ad hoc Networks and Sensor Networks - Wireless LAN Security -WiFi versus 3G. **(18 Hours)**

UNIT V

Wireless Devices with SYMBIAN OS: Introduction to SYMBIAN - SYMBIAN OS Architecture - Application for SYMBIAN - Controls and Compound Controls - Active objects Localization - Security on the SYMBIAN OS.**Voice over Internet Protocol and Convergence:** Voice Over IP - H.323 Framework for Voice Over IP - Session Initiation Protocol(SIP) - Communication between H.323 and SIP - Real-Time Protocols - Convergence Technologies - Call Routing - Voice Over IP Applications - IP Multimedia Subsystem (IMS) - Mobile VoIP - Voice Over Wireless LAN. **Security Issues in Mobile Computing:** Introduction - Information Security - Security Techniques and Algorithms - Security Protocols - Public Key Infrastructure - Trust - Security Models - Security Framework for Mobile Environment. **(18 Hours)**

BOOK FOR STUDY:

"Mobile Computing, Technology, Application and Service Creation", Second Edition, Asoke K Talukder, HasanAhamed, Roopa R Yavagal. Tata McGraw Hill Publishing Company Ltd, New Delhi, 2017.

UNIT I : Chapters : 1.3-1.6, 1.8, 1.9 2.4-2.6, 3

UNIT II : Chapters : 4, 5.1-5.7,5.9,5.11, 6

UNIT III : Chapters : 7, 8

UNIT IV : Chapters : 9, 10.1-10.8, 10.12

UNIT V : Chapters : 14, 17, 20

BOOKS FOR REFERENCE:

1. **"Mobile Communications",**Jochen Schiller, IIEdition,Dorling Kindersley (India) Pvt.Ltd.,2011.
2. **"Principles of Mobile Computing",**UweHansmann, LotharMerk, Martin S. Nicklous, Thomas Stober, Second Edition, Springer Private Ltd., 2006.
3. **"Mobile Computing",** Raj Kamal, Second Edition, Oxford University Press., 2011.

COMPUTER GRAPHICS

Semester: II **Hours: 6**

Code : 20PCS2E2B **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Implement various algorithms for scanning and discuss the basic output primitives, transformations.	PSO-1	AP
CO-2	Create interactive graphics applications.	PSO-1	S
CO-3	Perform simple 2D graphics with lines, curves and implement algorithms in rasterizing simple shapes, fill and clip polygons	PSO-1,2	AP
CO-4	Illustrate geometrical transformations of three dimensional viewing and projections.	PSO-2	C
CO-5	Design computer animation with virtual reality.	PSO-2,5	S

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II				**COMPUTER GRAPHICS**							**Hours: 6**
Code : 20PCS2E2B											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	3	3	3	3	3	4	3	3	4	4	3.36
CO-2	4	3	3	3	3	3	4	4	3	3	3	3.27
CO-3	4	3	3	3	3	3	4	3	3	3	3	3.18
CO-4	4	4	3	3	4	3	4	3	3	3	4	3.45
CO-5	4	3	3	3	3	3	4	3	3	3	3	3.18
Overall Mean Score												**3.29**

Result: The score for this course is **3.29** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

Introduction to Computer Graphics: Introduction – The History of Computer Graphics – Definitions – Broad Classifications of Computer Graphics – Architecture of Interactive Computer Graphics – Applications of Computer Graphics – **Display Devices**: Introduction – Display System – CRT Display Devices – Flat Panel Display Devices – Projectors – Hard Copy Output Devices – **Interactive Devices:** Introduction – Pointing and Positioning Devices – Pointing Constraints – Rubber Band Technique (RBT) **(18 Hours)**

UNIT II

Scan Conversion: Introduction – Pixel Plotting – Scan Conversion of Lines – Scan Conversion of Circle – Ellipse – Parabola – Hyperbola – Side Effects of Scan Conversion. **2-D Transformations:** Introduction – Classifications of Transformations – Types of Transformations – Representation of Point and Object – Geometric Transformations – Coordinate Transformations – Inverse Transformations – Concatenation of Similar Transformations – Homogeneous Coordinate. **2-D Viewing Transformation and Clipping:** Introduction – Window – Viewport – Viewing Transformation – Normalized Transformation – Workstation Transformations – Normalized Screen Coordinate – Clipping – Clipping Algorithm – Area Filling. **(18 Hours)**

UNIT III

3-D Transformation: Introduction – 3-D Geometry – 3-D Transformation-Coordinate Transformations – Relationship between Geometric and Coordinate Transformation Matrices. **Projection:** Introduction – Classification of 3D to 2D Projections – Basic Definitions of the Subclasses of the Parallel and Perspective Projections – Projections based upon Location of Centre of Projection and View Plane. **3-D Viewing and Clipping:** Introduction – 3D Viewing – 3D Clipping.

(18 Hours)

UNIT IV

Hidden Lines and Hidden Surfaces: Introduction – Z-Buffer Algorithm (Depth Buffer Algorithm) – The Painter's Algorithm (Depth Sort or Priority Algorithm) – Area-Subdivision Algorithm – Scan Line Algorithm. **Bezier Curves and B-Splines:** Introduction – Preliminary Definitions – Bezier Curve and Bezier Surface – B-Spline Curves and Surfaces – Bezier Spline Curve vs B-Spline Curve. **Animation:** Introduction – What is Animation – Effects on Picture During Animation – Categories of Animation – Problems in Computer Animation – Animation Functions – Animation Techniques – Uses of Animation – Animation Software – Animation File Formats. **(18 Hours)**

UNIT V

Multimedia: Introduction – What is Multimedia – Multimedia Technology – Multimedia Architecture – Trade-off Between Multimedia and Hardware – Multimedia Contents – Multimedia PC – Applications of Multimedia – Data Compression – Authoring System – Text, Hypertext, Hypermedia. **Color Models:** Introduction – Two basic Color Approaches – Color Models.**Illumination Models and Shading Models:** Introduction – Light Sources – Direct and Indirect Reflection – Types of Light – Components of Reflected Light – Illumination Models – Shading Models. **Segment:** Introduction – Functions on Segments – Methods of Representation of Display File – Image Transformation – Posting and Unposting Segments. **(18 Hours)**

BOOK FOR STUDY:

"Computer Graphics", Pradeep K. Bhatia, Dream Tech, Wiley, 3rdEdition, 2019.

Unit I	:	Chapters	:	1 - 3
Unit II	:	Chapters	:	4 - 6
Unit III	:	Chapters	:	7 - 9
Unit IV	:	Chapters	:	10 - 12
Unit V	:	Chapters	:	13– 15

BOOKS FOR REFERENCE:

1. **"Computer Graphics: Implementation and Explanation",** Jules Bloomenthal, 2019.
2. **"Computer Graphics with Virtual Reality System",** Rajesh K. Maurya, Wiley, 3rd Edition, 2018.
3. **"Computer Graphics, C Version",** Hearn Donald D and M Pauline Baker, Pearson Education India, 2nd Edition, 2014.

CLOUD COMPUTING

Semester: II **Hours: 6**

Code : 20PCS2E2C **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Understand the basic principles of parallel and distributed computing	PSO-1	K
CO-2	Demonstrate Virtualization and Architecture of Cloud computing	PSO-1,2	K
CO-3	Work with the cloud application platform.	PSO-1,2	AP
CO-4	Design the Map reducing program.	PSO-2	AP
CO-5	Explore advanced topics of cloud computing	PSO-4,5	S

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II				**CLOUD COMPUTING**							**Hours: 6**
Code : 20PCS2E2C											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	3	3	3	3	3	4	4	3	3	3	3.27
CO-2	4	3	3	3	3	3	4	4	3	3	4	3.36
CO-3	4	3	3	4	3	3	4	4	3	3	3	3.36
CO-4	4	3	3	4	3	3	4	4	3	3	4	3.45
CO-5	5	3	3	4	4	4	5	5	3	4	4	4
Overall Mean Score												**3.49**

Result: The score for this course is **3.49** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Introduction: Cloud Computing at a Glance – Historical Developments – Building Cloud Computing Environments – Computing Platforms and Technologies. **Principles of Parallel and Distributed computing:** Eras of Computing – Parallel vs Distributed Computing – Elements of Parallel Processing – Elements of Distributed Computing – Technologies for Distributed Computing. **(18 Hours)**

UNIT II

Virtualization: Introduction – Characteristics of Virtualized Environments – Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization – Technology Examples. **Cloud computing Architecture:** Introduction – Cloud Reference model – Types of Clouds **–** Economics of the Cloud – Open Challenges. **(18 Hours)**

UNIT III

ANEKA: Cloud Application Platform: Framework Overview – Anatomy of the Aneka Container – Building Aneka Clouds – Cloud Programming and Management. **CONCURRENT COMPUTING: Thread Programming:** Introducing Parallelism for Single Machine Computation – Programming Applications with Threads – Multithreading with Aneka – Programming Applications with Aneka Threads. **(18 Hours)**

UNIT IV

HIGH-THROUGHPUT COMPUTING: Task Programming: Task Computing – Task-based Application Models Aneka Task Based Programming**. DATA INTENSIVE COMPUTING : Map-Reduce Programming:** What is Data? - Intensive Computing – Technologies for Data-Intensive Computing – Aneka Map Reduce Programming Model. **(18 Hours)**

UNIT V

Cloud Platforms in Industry: Amazon web services – Google AppEngine – Microsoft Azure – Obeservation. **Cloud Applications:** Scientific Applications – Business and consumer Applications. **Advanced Topics in Cloud Computing:** Energy efficiency in clouds – Market based management of clouds – Federated clouds / InterCloud – Third partycloud services. **(18 Hours)**

BOOK FOR STUDY:

"**Mastering Cloud Computing**", Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, McGraw Hill Education (Indi) aPrivate Limited, 2013.

UNIT I : Chapters: 1, 2

UNIT II : Chapters: 3, 4

UNIT III : Chapters: 5, 6

UNIT IV : Chapters: 7, 8

UNIT V : Chapters: 9, 10, 11

BOOKS FOR REFERENCE

1. **"Cloud Computing: Concepts, Technology & Architecture"** ThamasErl, Zaigham Mahmood and Ricardo Puttini, Prentice Hall Prentice Hall, 2014.
2. **"Cloud Computing: Principles and Paradigms",** Rajkumar Buyya, James Broberg, Andrzej Goscinski, Wiley & Sons Inc., 2011.

MOBILE APPLICATION DEVELOPMENT - LAB

Semester: II **Hours: 3**

Code : 20PCS2P03 **Credits: 2**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Develop Android app using basic Android Programming concepts.	PSO-1,2	S
CO-2	Experiment Integrated Development Environment for Android Application Development.	PSO-2	AP
CO-3	Design and Implement User Interfaces and Layouts for developing Android App.	PSO-2	AP
CO-4	Use Intents activity and broadcasting data in Android App.	PSO-1,2	E
CO-5	Design Database Application and Content Providers..	PSO-2,5	S

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II				MOBILE APPLICATION DEVELOPMENT - LAB								Hours: 3
Code : 20PCS2P03												Credits: 2
Course Outcomes	Programme Outcomes (PO)						Programme Specific Outcomes (PSO)					Mean Score of CO's
	1	2	3	4	5	6	1	2	3	4	5	
CO-1	3	3	3	3	3	3	4	3	3	3	3	3.09
CO-2	3	3	3	3	3	3	4	4	3	3	3	3.18
CO-3	3	3	3	3	3	3	4	3	3	3	3	3.09
CO-4	3	3	3	3	3	3	3	3	3	3	3	3.00
CO-5	4	4	4	4	4	4	3	3	3	3	3	3.54
Overall Mean Score												**3.18**

Result: The score for this course is **3.18** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi-threading
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock

MICROPROCESSOR AND MICROCONTROLLER - LAB

Semester: II **Hours: 3**

Code : 20PCS2P04 **Credits: 2**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Apply the fundamentals of assembly level programming of microprocessors	PSO – 1,2	AP
CO-2	Perform arithmetic operation to understand the ALU of a computer	PSO – 1,2	E
CO-3	Evaluate different number systems and understand the number conversion.	PSO – 2	E
CO-4	Execute sorting, searching and reversing the elements in an array	PSO – 2	AP
CO-5	Design interfacing circuit with the processor	PSO – 1,5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II			**MICROPROCESSOR AND MICROCONTROLLER - LAB**						**Hours: 3**
Code : 20PCS2P04									**Credits: 2**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**			**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	4	4	3	4	3	3	4	4	3	3	3	3.45
CO-2	4	4	3	3	3	3	4	3	3	4	3	3.36
CO-3	4	4	3	3	3	3	4	3	3	3	3	3.27
CO-4	4	4	3	4	3	3	4	3	3	3	3	3.36
CO-5	4	4	3	4	3	4	4	4	3	4	3	3.64
Overall Mean Score												**3.42**

Result: The score for this course is **3.42** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

I. Addition and Subtraction

1. 8- bit Addition
2. 16- bit Addition
3. 8- bit Subtraction
4. BCD Subtraction

II. Multiplication and Division

1. 8- bit Multiplication
2. BCD Multiplication
3. 8- bit Division

III. Sorting and Searching

1. Sorting in ascending order
2. Finding largest and smallest elements from an array
3. Reversing array elements

IV. Code Conversion

1. BCD to HEX and HEX to BCD
2. Binary to ASCII and ASCII to Binary

V. Stepper Motor

SOFT SKILLS

Semester: II **Hours: 2**

Code : 20PSE2S01 **Credit: 1**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Develop their social, interpersonal, cognitive, ethical, professional, reading and communication skills	PSO-1	K
CO - 2	Increase their self-esteem and confidence.	PSO-2,4	Ap
CO - 3	Achieve their short and long term goals.	PSO-3	Sy
CO - 4	Prepare and formulate their resumes wisely.	PSO-4	Ap
CO - 5	Face the mock group discussions and interviews with a challenge and choose their right career.	PSO-5	Ap

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: II				**SOFT SKILLS**							**Hours: 2**
Code : 20PSE2S01											**Credit: 1**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO1	4	4	4	4	4	5	4	4	4	4	5	4.18
CO2	4	4	4	4	4	5	4	4	4	4	5	4.18
CO3	4	4	4	4	4	5	4	4	4	4	5	4.18
CO4	4	4	4	4	4	5	4	4	4	4	5	4.18
CO5	4	4	4	4	4	5	4	4	4	4	5	4.18
Overall Mean Score												**4.18**

Result: The Score for this Course is **4.18** (High Relationship)

Note:

Mapping	1 - 20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos = $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I: SOFT SKILLS

Introduction - Soft skills - Importance of soft skills - Selling your soft skills - Attributes regarded as soft skills - Soft skills - Social - Soft skills - Thinking - Soft skills - Negotiating - Exhibiting your soft skills - Identifying your soft skills - Improving your soft skills - will formal training enhance your soft skills - Soft Skills training - Train yourself - Top 60 soft skills - Practicing soft skills - Measuring attitude. **(6 Hours)**

UNIT II: CAREER PLANNING

Benefits of career planning - Guidelines for choosing a career - Myths about choosing a career - Tips for successful career planning - Developing career goals - Final thoughts on career planning - Things one should know while starting career and during his/her career. **(6 Hours)**

UNIT III: ART OF LISTENING AND SPEAKING

Two ears, one mouth - Active listening - Kinds of Listening, Common - poor listening habits - Advantages of listening - Listening Tips. Special features of Communication - Process - Channels of Communication - Net Work - Barriers - Tips for effective communication and Powerful presentation - Art of public speaking - Public Speaking tips - Over coming fear of public speaking. **(6 Hours)**

UNIT IV: ART OF READING AND WRITING

Good readers - Benefits - Types - Tips - The SQ3R Technique - Different stages of reading - Rates of Reading - Determining a student's reading rate - Increasing reading rate - Problems with reading - Effective reader - Importance of writing - Creative writing - Writing tips - Drawbacks of written communication. **(6 Hours)**

UNIT V: PREPARING CV / RESUME

Meaning - Difference among Bio-data, CV and Resume - The terms - The purpose of CV writing - Types of resumes - Interesting facts about resume - CV writing tips - CV/Resume preparation - the dos - CV/Resume preparation - the don'ts - Resume check up - Design of a CV - Entry level resume - The content of the resume - Electronic resume tips - References - Power words - Common resume blunders - Key skills that can be mentioned in the resume - Cover letters - Cover letter tips. **(6 Hours)**

COURSE BOOK:

- Dr. K. Alex, Soft Skills, Chand & Company Pvt. Ltd., New Delhi.

BOOKS REFERENCE:

1. Dr. T. Jeya Sudha & Mr. M.R. Wajida Begum : Soft Skills/Communication Skills, New Century Book House (P) Ltd., Chennai.
2. S. Hariharen, N. Sundararajan & S.P. Shanmuga Priya : Soft Skills, MJP Publishers, Chennai.

CONTINUOUS INTERNAL ASSESSMENT COMPONENT (CIA)

THEORY:

COMPONENT	MARKS
Internal test I	40
Internal test II	40
Seminar	10
Term Paper	5
Attendance	5
Total	**100**

CONTINUOUS INTERNAL ASSESSMENT COMPONENT (CIA)

Passing Minimum: 50% out of 100

INTERNAL QUESTION PATTERN

(Maximum Marks-40)

Part - A

10 Questions × 1Mark = 10 Marks

Part - B

2 Questions × 5 Marks = 10 Marks

(Internal Choice and One Question from Each Unit)

Part - C

2 Questions × 10 Marks = 20 Marks

(Open Choice, Two Questions out of Three)

NoSQL DATABASES

Semester: III **Hours: 4**

Code : 20PCS3C08 **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Acquire a deep knowledge on relational Database, Structured Query Language and Data Modeling.	PSO - 1	K
CO - 2	Acquire the Knowledge on MongoDB query language.	PSO - 1, PSO - 2	K
CO - 3	Comprehend the principles of NoSQL.	PSO-3	C
CO - 4	Differentiate NoSQL key value database and Document database.	PSO - 3, PSO - 4	AN
CO - 5	Know the concept of Column database and Understand the data modelling techniques.	PSO - 1, PSO - 3	K

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III				**NoSQL DATABASES**							**Hours: 4**
Code : 20PCS3C08											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	4	3	3	2	4	3	5	3	3	3	4	3.36
CO - 2	4	4	3	3	3	4	4	4	3	3	3	3.45
CO - 3	5	3	3	3	4	5	3	5	3	4	4	3.82
CO - 4	3	3	3	3	3	4	3	4	3	3	4	3.27
CO - 5	5	3	4	3	4	4	3	4	3	4	4	3.73
Overall Mean Score												**3.53**

Result: The Score for this Course is: **3.53** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Introduction - Database System Applications - View of Data - Database Languages - Relational Databases - Database Design - Data Storage and Querying - Transaction Management - Database Architecture - Data Mining and Information Retrieval - Specialty Databases - Database Users and Administrators - History of Database Systems. **Relational Databases**: **Introduction to the Relational Model**: Structure of Relational Databases - Database Schema - Keys - Shema Diagrams - Relational Query Languages - Relational Operations. **(12 Hours)**

UNIT II

Variety of NoSQL Databases: Data Management with Distributed Databases - ACID and BASE - Four Types of NoSQL Databases. **Key-Value Databases:** From Arrays to Key-Value Databases - Essential Features of Key-Value Databases - Keys: More Than Meaningless Identifiers. **Key-Value Database Terminology:** Key-Value Database Modeling Terms - Key-Value Architecture Terms - Key-Value Implementation Terms. **(12 Hours)**

UNIT III

Document Databases: What is a Document - Avoid Explicit Schema Definitions - Basic Operations on Document Databases. **Document Database Terminology:** Document and Collection Terms - Types of Partitions - Data Modeling and Query Processing. **Designing for Document Databases:** Normalization, Denormalization, and the Search for Proper Balance - Planning for Mutable Documents - The Goldilocks Zone of Indexes - Modeling Common Relations.

(12 Hours)

UNIT IV

Column Family Databases: In the Beginning, There was Google BigTable - Differences and Similarities to Key-Value and Document - Architectures Used in Column Family Databases - When to Use Column Family Databases. **Column Family Database Terminology:** Basic Components of Column Family Databases - Structures and Processes: Implementing Column Family -Processes and Protocols. **Designing for Column Family Databases:** Guidelines for Designing Tables - Guidelines for Indexing - Tools for Working with Big Data. **(12 Hours)**

UNIT V

Graph Databases: What is a Graph - Graphs and Network Modeling - Advantages of Graph Databases. **Graph Database Terminology:** Elements of Graphs - Operations on Graphs - Properties of Graphs and Nodes - Types of Graphs. **Designing for Graph Databases:** Getting Started with Graph Design - Querying a Graph - Tips and Traps of Graph Database Design. **(12 Hours)**

BOOKS FOR STUDY:

1. "**Database System Concepts",** Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Sixth Edition, McGrawHill, 2016.

   UNIT I : Chapters: 1, 2

2. **"NoSQL for Mere Mortals",** Dan Sullivan, Addison-Wesley, Pearson India Education Services Pvt. Ltd., 2016.

   UNIT II: Chapters: 2, 3, 4

   UNIT III: Chapters: 6, 7, 8

   UNIT IV: Chapters: 9, 10, 11

   UNIT V: Chapters: 12, 13, 14

BOOKS FOR REFERENCE:

1. **"NoSQL with MongoDB in 24 Hours"**, SAMS, Brad Dayley, Pearson Education, First Edition, 2015.
2. **"MongoDB in Action",** Kyle Banker, Peter Bakkum, Shaun Verch, Douglas Garrett, Tim Hawkins, Dreamtech Press, Second Edition, 2017.

DATA SCIENCE USING PYTHON

Semester: III **Hours: 4**

Code : 20PCS3C09 **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Understand the basic concepts of Python	PSO - 1	K
CO - 2	Prepare and pre-processing data	PSO - 2	AP
CO - 3	Visualize the results of analytics effectively	PSO - 3, PSO - 5	AP
CO - 4	Understand the basics of NumPy and Pandas	PSO - 1, PSO - 3	S
CO - 5	Learn the Visualization through Matplotlib	PSO - 1, PSO - 5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III				**DATA SCIENCE USING PYTHON**							**Hours: 4**
Code : 20PCS3C09											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	4	3	3	3	3	3	4	4	3	3	3	3.27
CO - 2	4	3	3	3	3	3	4	4	3	3	4	3.36
CO - 3	4	3	3	4	3	3	4	4	3	3	3	3.36
CO - 4	4	3	3	4	3	3	4	4	3	3	4	3.45
CO - 5	5	3	3	4	4	4	5	5	3	4	4	4
Overall Mean Score												**3.49**

Result: The Score for this Course is: **3.49** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Python for Data Analysis: Essential Python Libraries - Installation and setup - **Python Language Basics, IPython, and Jupyter Notebooks:** python basics - The python Interpreter- Ipython Basics - python language Basics - Data Structure and Sequences - Functions. **(12 Hours)**

UNIT II

NumPy Basics: Arrays and Vectorized Computation: The NumPyndarray: A Multidimensional Array Object - Universal Functions: Fast Element-wise Array Functions - File Input and Output with Arrays - Linear Algebra - PseudoRandom Number Generation. **(12 Hours)**

UNIT III

Getting started with pandas: Introduction to pandas Data Structures - Essential Functionality - Summarizing and Computing Descriptive Statistics. **(12 Hours)**

UNIT IV

Data Loading, Storage, and File Formats: Reading and Writing Data in Text Format - Binary Data Formats - Interacting with Web APIs - Interacting with Databases - Data Cleaning and Preparation - Handling Missing Data - Data transformation - **Data Wrangling:** Join, Combine, and Reshape Hierarchical Indexing - Combining and Merging Datasets - Reshaping and Pivoting. **(12 Hours)**

UNIT V

Plotting and Visualization: A Brief matplotlib API Primer - Plotting with pandas and seaborn - Time Series. **(12 Hours)**

BOOK FOR STUDY:

- **"Python for Data Analysis",** Wes McKinney, Published by O'Reilly Media, 2017.

UNIT I	**:**	Chapters	:	1.2 - 1.4, 2, 3.1,3.2
UNIT II	**:**	Chapter	:	4
UNIT III	**:**	Chapter	:	5
UNIT IV	**:**	Chapters	:	6, 7.1, 7.2, 8.1
UNIT V	**:**	Chapters	:	9, 11

BOOKS FOR REFERENCE:

1. **"Think Python: How to Think Like a Computer Scientist",** Allen B. Downey, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
2. **"Python Data Science Handbook"**, Jake Vander Plas, O'Reilly Media Publishers, 2016.

DATA COMMUNICATION AND NETWORK SECURITY

Semester: III **Hours: 4**

Code : 20PCS3C10 **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Describe the structure of OSI and TCP/IP model with its transmission media.	PSO - 1, PSO - 2	K
CO - 2	Explain the functions of data link layer and its protocols.	PSO - 1, PSO - 2	C
CO - 3	Illustrate the Session layer design issues and Transport layer services.	PSO - 3, PSO - 5	AN
CO - 4	Enlighten the functions of Application and Presentation layers with their Protocols.	PSO - 1, PSO - 3, PSO - 4	K
CO - 5	Discuss the importance of cryptography and network security.	PSO - 3, PSO - 5	C

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III			**DATA COMMUNICATION AND NETWORK SECURITY**						**Hours: 4**		
Code : 20PCS3C10											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	3	3	3	3	3	3	4	3	3	2	4	3.09
CO - 2	4	4	4	4	4	4	4	3	3	2	4	3.60
CO - 3	3	3	3	3	3	3	4	3	3	2	4	3.09
CO - 4	3	3	3	3	3	3	4	3	3	3	4	3.18
CO - 5	3	3	3	3	3	3	4	4	4	4	4	3.45
Overall Mean Score												**3.28**

Result: The Score for this Course is: **3.28** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

INTRODUCTION: Data Communication - Networks - Network Types - Internet History. **Network Models:** Protocol Layering - TCP/IP protocol suite - The OSI Model. **Physical Layer:** Data and Signals - Periodic Analog signals - Digital Signals - Transmission Impairment - Data Rate Limits - Performance. **BANDWIDTH UTILIZATION: Multiplexing and Spectrum Spreading:** Multiplexing. **Transmission Media:** Guided Media - Unguided Media : Wireless. **(12 Hours)**

UNIT II

DATA LINK LAYER: Error Detection and Correction: Introduction - Block coding - Cyclic Codes - Checksum. **Data Link Control:** DLC Services - Data Link Layer Protocols. **Media Access Control (MAC)**: Random Access - Controlled Access - Channelization. **Other Wired Networks:** ATM. **Wireless LANs:** IEEE 802.11 Project - Bluetooth. **Connecting Devices and Virtual LANs:** Connecting Devices - Virtual LANs. **(12 Hours)**

UNIT III

NETWORK LAYER: Introduction to Network Layer: Network - Layer Services - Packet Switching - Network Layer Performance - IPV4 Addresses. **Unicast Routing:** Introduction - Routing Algorithms - Unicast Routing protocols. **Next Generation IP:** IPv6 Protocol - Transmission from IPv4 To IPv6. **(12 Hours)**

UNIT IV

TRANSPORT LAYER: Introduction to Transport Layer: Introduction - Transport Layer Protocols. **Transport Layer Protocols:** Introduction - User Datagram Protocol - Transmission Control Protocol - SCTP. **Application Layer: Standard Client-Server Protocols** - World Wide Web and HTTP - FTP - Electronic Mail - Telnet - Secure Shell (SSH) - Domain Name Systems (DNS). **(12 Hours)**

UNIT V

TOPICS RELATED TO ALL LAYERS: Cryptography and Network Security: Introduction - Confidentiality - Other Aspects of Security. **Internet Security:** Network Layer Security - Transport Layer Security - Application Layer Security - Firewalls. **(12 Hours)**

BOOK FOR STUDY:

- "**Data Communications and Networking**" Behrouz A. Forouzan - TATA McGraw - Hill, Fifth Edition, Special Indian Edition 2013.

  UNIT I **:** Chapters : 1.1-1.4, 2.1-2.3, 3.1-3.6, 6.1, 7.1-7.3

  UNIT II **:** Chapters : 10.1-10.4, 11.1-11.2, 12.1-12.3, 14.4, 15.2-15.3, 17.1-17.2

  UNIT III **:** Chapters : 18.1-18.4, 20.1-20.3, 22.2, 22.4

  UNIT IV **:** Chapters : 23.1-23.2, 24.1-24.4, 26.1-26.6

  UNIT V **:** Chapters : 31.1-31.3, 32.1-32.4

BOOKS FOR REFERENCE:

1. **"Computer Networks"** By Andrew S. Tanenbaum, David J. Wetherall Fifth Edition, Pearson Prentice Hall PTR, 2014.
2. **"Cryptography and Network Security",** Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc Graw Hill Education, Special Indian Edition, Third Edition, 2016.

DATA SCIENCE USING SPREADSHEET

Semester: III **Hours: 4**

Code : 20PCS3GE2 **Credits: 3**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Work with Data Entry and various Functions and Formulae of Excel Workbook	PSO - 1, PSO - 3	AP
CO - 2	Work with referring data from different worksheet & workbook	PSO - 1, PSO - 2	AP
CO - 3	Perform Statistical Analysis techniques on data using Excel	PSO - 4, PSO - 5	AP
CO - 4	Understand Various Simulation techniques, Analysis and Forecasting methods will be taught	PSO - 1, PSO - 3	U
CO - 5	Acquire the knowledge of create flexible data aggregations using pivot tables and representing the data using pivot charts.	PSO - 1, PSO - 2	K

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III			**DATA SCIENCE USING SPREADSHEET**						**Hours: 4**			
Code : 20PCS3GE2												**Credits: 3**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	3	3	3	3	3	3	4	3	3	3	4	3.27
CO - 2	3	3	3	3	3	3	4	3	3	3	4	3.18
CO - 3	3	3	3	3	3	3	4	3	3	3	4	3.27
CO - 4	3	3	3	3	3	3	4	3	3	3	4	3.27
CO - 5	3	3	3	3	3	3	4	3	3	3	4	3.27
Overall Mean Score												**3.25**

Result: The Score for this Course is: **3.25** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

New in Excel 2019/Office 365: Structure - Objective - Use Excel - New interface of Excel 2019/Office 365 - Workbooks and Worksheets - New Functions in Excel 2019/Office 365 - New Charts in Excel 2019/Office 365 - Easier Sharing in Excel 2019/Office 365 - New Features in Excel 2019/Office 365 - Enhancement in Pivot table. **Entering Data in Excel:** Structure - Objective - Entering data manually - Importing data using Get & Transform data - Applying data validation. **(12 Hours)**

UNIT II

Transforming and Managing data: Structure - Objective - Protecting Worksheet and/or Workbook. **Formulas and Functions:** Objective - Writing Excel Formulas and functions - Functions - Basic Calculations - COUNT functions - Conditional Calculation - Logical Functions - Text functions. **(12 Hours)**

UNIT III

Data Analysis: Structure - Objective - Pivot tables - Calculation and grouping options - Power Pivot and Power Query - What-If Analysis - Analysis Toolpak - Forecast Sheet. **(12 Hours)**

UNIT IV

Data Visualization: Structure - Objective - Charts - Pivot Charts - Slicer - Timeline - Sparklines - Conditional Formatting (CF) - Power Map. **(12 Hours)**

UNIT V

Data Extraction: Structure - Objective - Print Excel Files - Understanding page setup options - Page orientation - Export or Upload to Power BI - Share files via Email. **Automation in Excel through Macros:** Structure - Objective - Macros - Record a Macro - Save a Macro - Run a Macro. **(12 Hours)**

BOOK FOR STUDY:

- **"Excel 2019 All-in-One",** Lokesh Lalwani, BPB Publications, First Edition, 2019.

UNIT I	**:**	Chapters	: 1, 2
UNIT II	**:**	Chapters	: 3, 4
UNIT III	**:**	Chapter	: 5
UNIT IV	**:**	Chapter	: 6
UNIT V	**:**	Chapters	: 7, 8

BOOKS FOR REFERENCE:

1. **"Guerrilla Data Analysis Using Microsoft Excel",** Oz du Soleil & Bill Jelen, 2nd Edition, Holy Macro Books, 2015.
2. **"Microsoft Excel 2010 Data Analysis and Business Modeling"**, Wayne L. Winston, PHI Learning Private Limited, 2013

BIG DATA ANALYTICS

Semester: III **Hours: 6**

Code : 20PCS3E3A **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Explain the use of Big Data in Business Context.	PSO - 1, PSO - 2	C
CO - 2	Design strategies to Storing Data in Databases and Data warehouses	PSO - 4, PSO - 5	AP
CO - 3	Develop hands-on experience on manipulating and exploring data in R	PSO - 3	AP
CO - 4	Comprehend the Social Media Analytics and Text Mining.	PSO - 2, PSO - 5	C
CO - 5	Exhibit a Job in the Big Data Market	PSO - 4, PSO - 5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III			**BIG DATA ANALYTICS**						**Hours: 6**			
Code : 20PCS3E3A												**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 2	4	4	4	4	4	4	4	3	3	2	4	3.60
CO - 3	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 4	3	3	3	3	3	3	4	3	3	3	4	3.18
CO - 5	3	3	3	3	3	3	4	4	4	4	4	3.45
Overall Mean Score												**3.43**

Result: The Score for this Course is: **3.43** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Exploring the use of Big Data in Business Context: Use of Big Data in Social Networking - Use of Big Data in Preventing Fraudulent Activities - Use of Big Data in Detecting Fraudulent Activities in Insurance Sector - Use of Big Data in Retail Industry. **Introducing Technologies for Handling Big Data:** Distributed and Parallel computing for Big Data - Introducing Hadoop - Cloud computing and Big Data - In Memory Computing Technology for Big Data. **Understanding Big Data Technology Foundations:** Exploring the Big Data Stack - Virtualization and Big Data - Virtualization Approaches. **(18 Hours)**

UNIT II

Storing Data in Databases and Data Warehouses: RDBMS and Big Data - Non-Relational Database - Polyglot Persistence - Integrating Big Data with Traditional Data Warehouses - Big Data Analysis and Data Warehouse - Changing Deployment Models in Big Data Era. **Understanding Analytics and Big Data:** Comparing Reporting and Analysis - Types of Analytics - Points to Consider during Analysis - Developing an Analytic Team - Understanding Text Analytics. **Analytical Approaches and Tools to Analyze Data:** Analytical Approaches - History of Analytical Tools - Introducing Popular Analytical Tools - Comparing Various Analytical Tools - Installing R - Installing R Studio. **(18 Hours)**

UNIT III

Exploring R: Exploring Basic Features of R - Exploring RGUI - Exploring RStudio - Handling Basic Expression in R - Variables in R - Working with Vectors - Storing and Calculating Values in R - Creating and Using Objects - Interacting with Users - Handling Data in R Workspace - Executing Scripts - Creating Plots - Accessing Help and Documentation in R. **Reading Datasets and Exporting Data from R:** Using the c() Command - Using the scan() command - Reading Multiple Data Values from Large files - Reading Data from R Studio - Exporting Data from R. **Manipulating and Processing Data in R:** Selecting the most appropriate Data Structure - Creating Data Subsets - Merging Datasets in R - searching Data - Putting your Data into Shape - Managing Data in R Using Matrices - Managing Data in R using Data frames. **(18 Hours)**

UNIT IV

Working with Functions and Packages in R: Using Functions instead of Scripts - Using Arguments in Functions - Built-in Functions in R - Introducing Packages - Working with Packages. **Performing Graphical Analysis in R:** Using Plots - Saving Graphics to External files - Advanced features of R. **Social Media**

Analytics and Text Mining: Introducing Social Media - Introducing Key Elements of Social Media - Introducing Text Mining - Understanding Text Mining Process - Sentiment Analysis - Performing Social Media Analytics and Opinion Mining on Tweets. **(18 Hours)**

UNIT V

Mobile Analytics: Introducing Mobile Analytics - Introducing Mobile Analytics Tools - Performing Mobile Analytics - Challenges of Mobile Analytics. **Finding a Job in the Big Data Market:** Important and Scope of Big Data Jobs - Big Data Opportunities - Skill Assessment for Big Data Jobs - Roles and Responsibilities in Big Data Jobs - Gaining a Foothold in the Big Data Market - Basic Educational Requirements for Big Data Jobs - Basic Technological Requirements for Big Data Jobs - Tools Supporting Big Data - Consultants and In-house specialists in Big Data - Tactics for Searching Big Data Jobs - Preparing for Interview - Obtaining Big Data Jobs through Social Media. **(18 Hours)**

BOOK FOR STUDY:

- **"Big Data Black Book",** DT Editorial Services, DreamTech Press, 2017.

UNIT I	**:**	Chapters	: 2, 3, 6
UNIT II	**:**	Chapters	: 7, 18, 19
UNIT III	**:**	Chapters	: 20, 21, 22
UNIT IV	**:**	Chapters	: 23, 24, 28
UNIT V	**:**	Chapters	: 29,30

BOOKS FOR REFERENCE:

1. **"Big Data Imperatives",** Soumendra Mohanty, Madhu Jagadeesh, Harsha Srivatsa, APress, First Indian Reprint 2013.
2. "**Big Data Fundamentals"**, Thomas Erl, Wajid Khattak, Paul Buhler, Pearson Education, First Impression, 2016.

DIGITAL IMAGE PROCESSING

Semester: III **Hours: 6**

Code : 20PCS3E3B **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Review the fundamental concepts of a digital image processing system.	PSO - 1, PSO - 3	K
CO - 2	Apply various transformation functions and filters for image enhancement.	PSO - 2, PSO - 3	AP
CO - 3	Identify the image degradation models and analyze various image sharpening techniques used to reconstruct the image.	PSO - 1, PSO - 2	K
CO - 4	Design & Synthesize Color image processing in real world application.	PSO - 4, PSO - 5	S
CO - 5	Interpret various image compression and image segmentation techniques.	PSO - 3, PSO - 5	C

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III				**DIGITAL IMAGE PROCESSING**							**Hours: 6**
Code : 20PCS3E3B											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 2	3	3	3	3	3	3	4	4	3	3	3	3.18
CO - 3	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 4	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 5	4	4	4	4	4	4	3	3	3	3	3	3.54
Overall Mean Score												**3.41**

Result: The Score for this Course is: **3.41** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

Introduction: Digital Image Processing - The Origins of Digital Image Processing - Examples of Fields that Use Digital Image Processing - Fundamental Steps in Digital Image Processing - Components of an Image Processing System. **Digital Image Fundamentals:** Light and the Electromagnetic Spectrum - Image Sensing and Acquisition - Image Sampling and Quantization - Some Basic Relationships between Pixels. **(18 Hours)**

UNIT II

Intensity Transformations and Spatial Filtering: Background - Some Basic Intensity Transformation Functions - Histogram Processing - Fundamentals of Spatial Filtering - Smoothing (Lowpass) Spatial Filters - Sharpening (Highpass) Spatial Filters - Combining Spatial Enhancement Methods. **(18 Hours)**

UNIT III

Filtering in the Frequency Domain: Background - Preliminary Concepts - Sampling and the Fourier Transform of Sampled Functions - The Discrete Fourier Transform of One Variable - Extensions to Functions of Two Variables - Some Properties of the 2-D DFT and IDFT - The Basics of Filtering in the Frequency Domain - Image Smoothing Using Lowpass Frequency Domain Filters - Image Sharpening Using Highpass Filters - Selective Filtering - The Fast Fourier Transform. **(18 Hours)**

UNIT IV

Image Restoration and Reconstruction: A Model of the Image Degradation/Restoration Process - Noise Models - Restoration in the Presence of Noise Only-Spatial Filtering - Periodic Noise Reduction by Frequency Domain Filtering. **Color Image Processing:** Basics of Full-Color Image Processing - Color Transformation - Color Image Smoothing and Sharpening - Noise in Color Images - Color Image Compression. **(18 Hours)**

UNIT V

Image Compression and Watermarking: Fundamentals - Huffman Coding - Arithmetic Coding - Run-length Coding - Predictive Coding. **Image Segmentation:** Fundamentals - Thresholding - Merging - Superpixels - Region Segmentation Using Graph Cuts - Segmentation using Morphological Watersheds. **(18 Hours)**

BOOK FOR STUDY:

- **"Digital Image Processing",** Rafael C. Gonzalez, Richard E. Woods, Fourth Edition, Pearson Education, New Delhi, 2018.

  UNIT I **:** Chapters : 1, 2

  UNIT II : Chapter : 3

  UNIT III **:** Chapter : 4

  UNIT IV **:** Chapters : 5, 6

  UNIT V **:** Chapters : 8, 10

BOOKS FOR REFERENCE:

1. **"Digital Image Processing",** S. Jayaraman, S. Esakkirajan, T. Veerakumar, Mc Graw Hill Education (India) Private Limited, Second Edition 2020.
2. **"Fundamentals of Digital Image Processing",** Anil K. Jain, PHI Private Limited, New Delhi, 2010.

ARTIFICIAL INTELLIGENCE

Semester: III **Hours: 6**

Code : 20PCS3E3C **Credits: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Gain knowledge in intelligent agent and different types of agents to solve problems.	PSO - 2	K
CO - 2	Design intelligent system for game playing.	PSO - 3, PSO - 4	AP
CO - 3	Represent various real-life domains using logic-based techniques	PSO - 3, PSO - 4	AP
CO - 4	Apply knowledge representation, reasoning and machine learning techniques to real world issues.	PSO - 2, PSO - 3	AP
CO - 5	Enhance the skills to build simple knowledge-based system.	PSO - 3, PSO - 5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III			**ARTIFICIAL INTELLIGENCE**								**Hours: 6**
Code : 20PCS3E3C											**Credits: 4**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	4	4	4	2	4	3	4	5	4	4	3	3.73
CO - 2	4	5	4	3	3	4	4	5	4	3	2	3.73
CO - 3	4	4	3	2	3	3	4	4	5	3	4	3.55
CO - 4	3	3	3	2	5	2	4	4	4	5	5	3.64
CO - 5	3	3	3	2	2	3	4	4	4	3	4	3.18
Overall Mean Score												**3.56**

Result: The Score for this Course is: **3.56** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

UNIT I

Introduction: The Foundations of Artificial Intelligence - The History of Artificial Intelligent - The State of the Art. **Intelligent Agents:** Agents and Environments - Good behavior: The Concept of Rationality - The Nature of Environments - The Structure of Agents. **(18 Hours)**

UNIT II

PROBLEM SOLVING: Solving Problems by Searching: Problem - Solving Agents - Example Problems - Searching for Solutions - Uninformed Search Strategies - Informed (Heuristic) Search Strategies - Heuristic Functions. **Adversarial Search:** Games - Optimal Decision in Games - Alpha - Beta Pruning - Imperfect Real - Time Decisions - Stochastic Games - Partially Observable Games - State-of-the-Art Game Programs. **(18 Hours)**

UNIT III

Logical Agents: Knowledge- Based Agents - Logic - Propositional Logic: A very Simple Logic**. First-Order Logic:** Representation Revisited - Syntax and Semantics of First-Order Logic - Using First-Order Logic. **Classical Planning**: Definition of Classical Planning - Algorithm for Planning as State-Space Search - Planning Graphs. **Planning and Acting in the Real World**: Time, Schedules, and Resources - Hierarchical Planning. **Knowledge Representation**: Ontological Engineering - Categories and Objects - Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information - The Internet Shopping World. **(18 Hours)**

UNIT IV

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain - The Semantics of Bayesian Networks - Efficient Representation of Conditional Distributions - Exact Inference in Bayesian Networks. **Making Simple Decisions:** Combining Beliefs and Desires Under Uncertainty - The Basis of Utility Theory - Utility Functions - Multiattribute Utility Functions - Decision Networks. **Learning From Examples**: Forms of Learning - Supervised Learning - Learning Decision Trees - Evaluating and Choosing the Best Hypothesis - The Theory of Learning - Regression and Classification with Linear Models. **Reinforcement Learning:** Introduction - Passive Reinforcement Learning - Active Reinforcement Learning. **(18 Hours)**

UNIT V

Natural Language Processing: Language Models - Text Classification - Information Retrieval. **Natural Language for Communication:** Phrase Structure Grammars - Syntactic Analysis (Parsing) - Augmented Grammars and Semantic Interpretation - Machine Translation - Speech Recognition. **Perception:** Image Formation - Early Image-Processing Operations - Object Recognition by Appearance - Reconstructing the 3D World. **Robotics:** Introduction - Robot Hardware - Robotic Perception. **(18 Hours)**

BOOK FOR STUDY:

- **"Artificial Intelligence: A Modern Approach",** S. Russell, P. Norvig, Pearson, Third Edition, 2016.

  UNIT I : Chapters : 1, 2.

  UNIT II : Chapters : 3, 5

  UNIT III : Chapters : 7.1, 7.3, 7.4, 8.1-8.3, 10.1-10.3, 11.1, 11.2, 12.1-12.7

  UNIT IV : Chapters : 14.1-14.4, 16.1-16.5, 18.1-18.6, 21.1-21.3

  UNIT V : Chapters : 22.1-22.3, 23.1-23.4, 24.1-24.4, 25.1-25.3

BOOKS FOR REFERENCE:

1. **"Artificial Intelligence",** Dr.Nilakshi Jain, Wiley India Pvt.Ltd, 2019.
2. **"Artificial Intelligence",** Michael Negnevitsky, Pearson India Education Services Pvt.Ltd, Third Edition, 2020

NOSQL DATABASE - LAB

Semester: III **Hours: 3**

Code : 20PCS3P05 **Credits: 2**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Create a simple Structured query program	PSO - 1	S
CO - 2	Design database using MongoDB	PSO - 3, PSO - 4	AP
CO - 3	Apply distributed techniques for querying documents and modification	PSO - 4	AP
CO - 4	Process and design forms to upload the JSON files	PSO - 2	AP
CO - 5	Test and debug regular expression and indexing	PSO - 1, PSO - 2	E

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III			**NOSQL DATABASE - LAB**								**Hours: 3**
Code : 20PCS3P05											**Credits: 2**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	3	3	3	3	3	3	4	3	3	3	3	3.09
CO - 2	3	3	3	3	3	3	4	4	3	3	3	3.18
CO - 3	3	3	3	3	3	3	4	3	3	3	3	3.09
CO - 4	3	3	3	3	3	3	3	3	3	3	3	3.00
CO - 5	4	4	4	4	4	4	3	3	3	3	3	3.54
Overall Mean Score												**3.18**

Result: The Score for this Course is: **3.18** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos

1. Design database using MongoDB
2. Create a sample document for a small appliance with the following attributes: appliance ID, name, description, height, width, length, and shipping weight. Use the JSON format.
3. Write a MongoDB query to display all the documents in the collection restaurants.
    a. Display the fields restaurant_id, name, borough and cuisine for all the documents in the collection restaurant.
    b. Display the fields restaurant_id, name, borough and cuisine, but exclude the field _id for all the documents in the collection restaurant.
    c. Query to find the restaurants who achieved a score more than 90.
4. Create database EMP and Make Collection With name "EMPL" and do add, update, delete query
5. Formatting Data using 'Proper Format'
6. Create any one collection name ''University'' and perform aggregation query in mongodb
7. Using MongoDB shell, create a script to output in a new collection named BoostedStudents one document for every document in Student collection with their final grade being boosted by 10%.
8. Aggregation operations
    a. matches all documents with a name starting from aA
    b. groups them by average final score
    c. sorts them by average score
    d. projects(selects) name and average score in the output
9. MongoDB Replication

DATA SCIENCE USING PYTHON - LAB

Semester: III **Hours: 3**

Code : 20PCS3P06 **Credit: 1**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Develop simple program using Python.	PSO - 1, PSO - 2	K
CO - 2	Apply rich controls and conditional statement logic in Python.	PSO - 2, PSO - 3	AP
CO - 3	Demonstrate the functionality of stack and regular expressions through Python.	PSO - 1, PSO - 4	AP
CO - 4	Create and manipulate array functions using Numpy.	PSO - 3	S
CO - 5	Build applications using Pandas.	PSO - 2, PSO - 5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III			**DATA SCIENCE USING PYTHON - LAB**						**Hours: 3**		
Code : 20PCS3P06											**Credits: 1**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	4	3	3	4	3	3	4	4	4	3	3	3.45
CO - 2	5	3	4	3	4	3	4	3	3	3	4	3.55
CO - 3	4	4	3	4	3	3	4	4	4	3	3	3.55
CO - 4	4	3	3	4	4	3	4	4	3	3	4	3.55
CO - 5	5	3	3	4	4	4	5	5	3	4	4	4.00
Overall Mean Score												**3.62**

Result: The Score for this Course is: **3.62** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

1. Python applications to
    a. Find the factorial of n numbers
    b. Check prime or not
    c. String palindrome
    d. Generate Armstrong number
2. Python application to generate the random string
3. Python Program to
    a. find sum of array
    b. find largest element in an array
    c. to Split the array and add the first part to the end
4. Python applications using dictionaries, lists and tuples.
5. Python applications to perform matrix multiplication, division and transpose of matrix
6. Create Calculator Program
7. Array Function using Numpy
8. Aggregation function using Numpy
9. Data Operation using Scipy Basics
10. Pandas Basics
11. Twitter API Integration for tweet Analysis

HUMAN RIGHTS AND DUTIES

Semester: III **Hours: 2**

Code : 20PSE3H02 **Credit: 1**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Discuss the Meaning and Definitions of Human Rights and Historical Evolution of Human Rights.	PSO - 5	K, A, E
CO - 2	Explain the Human Rights Education and Constitutional Provision for protection of Human Rights in India.	PSO - 5	K, A, E
CO - 3	Assess the Human Rights Activities in India	PSO - 5	K, A, E
CO - 4	Analyse the Welfare Acts of Women in India.	PSO - 5	K, A, E
CO - 5	Evaluate the need of Welfare Acts for the protection of Human Rights in India.	PSO - 5	K, A, E

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III			**HUMAN RIGHTS AND DUTIES**								**Hours: 2**	
Code : 20PSE3H02												**Credit: 1**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO-1	5	5	5	5	5	3	2	3	3	2	5	3.90
CO-2	5	5	5	5	5	3	2	3	3	2	5	3.90
CO-3	5	5	5	5	5	3	2	3	3	2	5	3.90
CO-4	5	5	5	5	5	3	2	3	3	2	5	3.90
CO-5	5	5	5	5	5	3	2	3	3	2	5	3.90
Overall Mean Score												**3.90**

Result: The score for this course is **3.90** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos = $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

Introduction - Meaning and Definitions of Human Rights - Historical Evolution of Human Rights - Universal Declaration of Human Rights 1948-Human Rights Day. **(6 Hours)**

UNIT II

Human Rights Education - Constitutional Provision for protection of Human Rights in India - Fundamental Rights and Directive principles of State Policy - Fundamental Duties - Protection of Human Rights Act of 1993. **(6 Hours)**

UNIT III

Human Rights Activities in India - National Human Rights Commission - State Human Rights Commission - Structure - functions - Human Rights courts - Role of NGOs - Amnesty - People's Watch. **(6 Hours)**

UNIT IV

The Child Marriage Restraint Act, 1929 - Amended in 1978 - The Special Marriage Act, 1954 - The Hindu Marriage Act, 1955 - The Hindu Adoption and Maintenance Act, 1956 - The Hindu Succession Act, 1956 - The Hindu Minority and Guardianship Act, 1956 - Suppression of Immoral Traffic in Women and Girls Act, 1956 - Devadasis Abolition Act, 1958 - The Hindu Widow Remarriage Act, 1959 - The Dowry Prohibition Act, 1961 - The Maternity Benefit Act, 1961. **(6 Hours)**

UNIT V

The Medical Termination of Pregnancy Act, 1971 - Criminal Law (Amendment) Act, 1983 - The Family Courts Act, 1984. Indecent Representation of Women Prohibition Act, 1986 - Dissolution of Muslim Marriage Act, 1939 and Muslim Women's (Protection of Rights in Divorce) Act, 1986 - Prohibition of Sati Act and Sati Prevention Act, 1987 - Abolition of Female Infanticide - Self Respect Marriage Act - Hindu Women's Property Act - The Tamil Nadu Prohibition of Harassment of Women Act, 1998 - (Protection of Children from Sexual Offences) POCSO Act 2012. **(6 Hours)**

COURSE BOOK:

- Human Rights and Duties - Dr. P. Floras Mary & Dr. V. Santhi, Pandiyanadu Cultural Foundation, 3/26, Nellaiyappa Puram, 1st Street, Thirunagar, Madurai, 2021.
- Website: pandiyanadu.in.

BOOKS FOR REFERENCE

1. Justice Iyer, Dr. Ambedkar and The Dalit Future, B.R. Publishing Co, New Delhi. 1990
2. Bajwa, G.S, Human Rights in India, Anmol Publications Pvt. Ltd., New Delhi, 1995.
3. Paramasivam Sivagami, Human Rights - A Study, Sriram Computer Printer & offset, Salem, Tamilnadu, 1998.
4. Rajendar Mangari The Protection Of Human Rights Act and Relating Laws, Book Agency, Hyderabad - 1., 1999.
5. Jayapalan, N, Women and Human Rights, Atlantic Publishers and Distributors, New Delhi. , 2001.

INTERNSHIP CUM MINI PROJECT

Semester: III
Code : 20PCS3IN1 **Credits: 2**
COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Acquire practical knowledge within the chosen area of technology for project development.	PSO - 2	AP
CO - 2	Apply knowledge of computing and information technologies to produce effective designs and solutions for specific computer-based problems.	PSO - 2, PSO - 4	AP
CO - 3	Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach.	PSO - 2, PSO - 5	AN
CO - 4	Describe the impact upon society of computers, and the technical and human aspects of this impact.	PSO - 3, PSO - 4	AP
CO - 5	Effectively communicate during project development and present results for the area of concentration.	PSO - 5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: III				**INTERNSHIP CUM MINI PROJECT**							**Credits: 2**
Code : 20PCS3IN1											
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 2	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 3	3	3	3	3	3	3	4	3	3	3	4	3.18
CO - 4	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 5	3	3	3	3	3	3	4	3	3	3	4	3.18
Overall Mean Score												**3.34**

Result: The Score for this Course is: **3.34** (High Relationship)
Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

INTERNET OF THINGS

Semester: IV **Hours: 5**

Code : 20PCS4C11 **Credits: 5**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Understand the fundamentals of Internet of Things, Frameworks and patterns.	PSO - 1, PSO - 3	U
CO - 2	Compare Four Layer and Seven Layer Architecture in IoT.	PSO - 1, PSO - 2	C
CO - 3	Design and develop IoT platform design Methodology using Artificial Intelligence.	PSO - 3, PSO - 5	AP
CO - 4	Apply the concept of Data Analytics and Machine Learning and Security Concepts in IoT.	PSO - 3, PSO - 5	AP
CO - 5	Apply the IoT Experiments and Project ideas in creation of smart world scenario.	PSO - 3, PSO - 5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: IV				**INTERNET OF THINGS**							**Hours: 5**
Code : 20PCS4C11											**Credits: 5**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 2	3	3	3	3	3	3	4	4	3	3	3	3.18
CO - 3	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 4	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 5	4	4	4	4	4	4	3	3	3	3	3	3.54
Overall Mean Score												**3.41**

Result: The Score for this Course is: **3.41** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

Internet of Things: Brief Introduction to Various Technologies Used in IoT - IoT Revolution - Benefits of IoT - IoT and Robotic Work Automation - Future of IoT - Case study: 3D Air Quality Modeling by Using Sensor Drones. **IoT Frameworks:** IoT Value Chain - IoT Frameworks and Platforms - AWS IoT - Watson IoT Platform - IoT Ecosystem - Elements for IoT Implementation - Case Studies. **Design Patterns for IoT:** Various Design Patterns - Challenges and Solutions and Designing Architecture for IoT. **(15 Hours)**

UNIT II

IoT Architecture Choices: Four Layer Architecture - Seven Layer Architecture - Hadoop - Final Considerations - Case Studies. **IoT Core Modules:** Protocols - Sensors - Endpoints - Data Communication - IoT Data Management - Analytics - Case Studies. **Essential Elements for Designing IoT Architecture:** UML - Use of UML - Different Types of UML Diagrams - Interaction Overview Diagram - Timing Diagram - Sequence UML Diagram - Communication UML Diagram - Class Diagram - Object Diagram - Composite Structure Diagram - Deployment Diagram - Package Diagram - Profile Diagram - Case Studies. **(15 Hours)**

UNIT III

IoT Implementation Strategies: Challenges and Solutions - Before an IoT Implementation. **Types of Testing in IoT:** Types of Testing in IoT - IoT Testing Challenges - IoT Testing Tools - Testing Smart Wearables - Future of Testing in the Internet of Things - Test Automation in IoT - Case Studies. **Artificial Intelligence for IoT:** Exploring the World of AI - AI and IoT: A Logical Combination - IoT and AI in the Context of Industry 4.0 - Case Studies. **(15 Hours)**

UNIT IV

Data Analytics and Machine Learning for IoT: Impact of Data Analytics and Machine Learning in IoT - Machine Learning Models - Case Studies. **Security Challenges for IoT:** Botnets - Mirai - Spam Emails - Ransomware - Medical IoT Devices - Man in the Middle Attack - Remote Vehicle Access - Weak Passwords- DDos Attack -Lack of Updates - IP Spoofing - Targeting Cameras in IoT Ecosystem - Anatomy of an IoT Cyber Attack - Case Studies. **(15 Hours)**

UNIT V

Holistic View on IoT Security: Cyber Security - Physical and Hardware Security - Cryptography - Blockchain in IoT - Identity Management for Devices-Best Security Practices - Case Study. **Hands-on Examples for IoT Experiments:** Arduino - Raspberry Pi - Case Studies. **IoT Project Ideas:** Vehicle Tracking System Based on GPS and GSM - Baby Monitoring System Using Raspberry Pi - IoT Based Air Quality Monitoring System - Smart Camera Based on IoT by Using Android and Raspberry Pi - Smart Parking System based on IoT by Using RFID - Smart Street Light Based on IoT - IoT Based Smart Doorbell System - Smart Walking Stick for Visually Impaired. **(15 Hours)**

BOOK FOR STUDY:

- "**Internet of Things Architecture, Implementation and Security**", Mayur Ramgir, Pearson Education, First Impression, 2020.

UNIT I	**:**	Chapters	: 1, 2, 3
UNIT II	**:**	Chapters	: 4, 5, 6
UNIT III	**:**	Chapters	: 7, 8, 9
UNIT IV	**:**	Chapters	: 10, 11
UNIT V	**:**	Chapters	: 12, 13, 14

BOOKS FOR REFERENCE:

1. **"Internet of Things Architecture and Design Principles"**, Raj Kamal, Mc Graw Hill Education (India) Private Limited, 2017.
2. **"IoT Fundamentals",** David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton, Jerome Henry, CisCo, Pearson India Education Services Pvt. Ltd, 2018.

MACHINE LEARNING

Semester: IV **Hours: 5**

Code : 20PCS4C12 **Credits: 5**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Gain knowledge about basic concepts of Machine Learning	PSO - 1, PSO - 3	K
CO - 2	Design and develop an appreciation for what is involved in learning from data	PSO - 4, PSO - 5	AP
CO - 3	Design machine learning and associated algorithms that can address one of the real-world problems that they selected forthe experiment.	PSO - 3, PSO - 5	AP
CO - 4	Apply knowledge representation, reasoning and machine learning techniques to real world issues.	PSO - 2, PSO - 3, PSO - 4	AP
CO - 5	Enhance the skills to build simple knowledge-based system	PSO - 1, PSO - 3, PSO - 4	AN

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: IV				**MACHINE LEARNING**							**Hours: 5**
Code : 20PCS4C12											**Credits: 5**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	4	4	4	2	4	3	4	3	4	4	3	3.55
CO - 2	4	5	4	3	3	4	4	4	4	3	2	3.64
CO - 3	4	4	3	2	3	3	4	3	4	3	4	3.36
CO - 4	3	3	3	2	3	2	4	4	4	5	5	3.45
CO - 5	3	3	3	2	2	3	4	4	4	3	4	3.18
Overall Mean Score												**3.44**

Result: The Score for this Course is: **3.44** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score for Cos= $\frac{\text{Total of Mean Scores}}{\text{Total No. of Cos}}$

UNIT I

Introduction: Machine Learning - Example of Machine Learning Applications - **Supervised Learning**: Learning a Class from Examples, Vapnik - Chervonenkis Dimension - Probably Approximately Correct Learning - Noise - Learning multiple classes - Regression - Model selection and generalization - Dimensions of a Supervised Machine Learning Algorithm. **Bayesian Decision Theory:** Introduction - Classification - Losses and Risks - Discriminant Functions - Association Rules. **Parametric Methods:** Introduction - Maximum Likelihood Estimation - Evaluating an Estimator: Bias and Variance - The Bayes' Estimator - Parametric Classification - Regression - Tuning Model Complexity: Bias/Variance Dilemma - Model Selection Procedures - **Multivariate Methods:** Multivariate Data Parameter Estimation - Estimation of Missing Values - Multivariate Normal Distribution - Multivariate Classification - Tuning Complexity - Discrete Features

(15 Hours)

UNIT II

Dimensionality Reduction: Introduction - Subset Selection - Principal Component Analysis - Feature Embedding - Factor Analysis - Singular Value Decomposition and Matrix Factorization - Multidimensional Scaling - Linear Discriminate Analysis - Canonical Correlation Analysis - Isomap - Locally Linear Embedding - Laplacian Eigenmaps. **Clustering:** Introduction - Mixture Densities - k-Means Clustering - Expectation - Maximization Algorithm - Mixtures of Latent Variable Models - Supervised Learning after Clustering - Spectral Clustering - Hierarchical clustering - Choosing the number of clusters. **Non-parametric Methods**: Introduction - Non-Parametric Density Estimation - Generalization to Multivariate Data - Non Parametric Classification - Condensed Nearest Neighbor - Distance-Based Classification - Outlier Detection. **Decision Trees:** Introduction - Univariate Trees - Pruning - Rule Extraction from Trees - Learning Rules from Data - Multivariate Trees. **(15 Hours)**

UNIT III

Linear Discrimination: Introduction - Generalizing the Linear Model - Geometry of the Linear Discriminant - Pairwise Separation - Parametric Discrimination Revisited - Gradient Descent - Logistic Discrimination - Discrimination by Regression - Learning to Rank. **Multilayer Perceptrons:** Introduction - The Perceptron - Training a Perceptron - Learning Boolean Functions - Multilayer Perceptrons - MLP as a Univarsal Approximator - Backpropogation Algorithm - Training Procedures. **Local Models:** Introduction - Competitive Learning - Radial Basis Functions - Incorporating Rule-Based Knowledge - Normalized Basis Functions - Competitive Basis Functions - Learning Vector Quantization - The Mixture of Experts - Hierarchical Mixture of Experts. **(15 Hours)**

UNIT IV

Kernel Machines: Introduction - Optimal Separating Hyperplane - The Nonseparable Case: Soft Margin Hyperplane - v-SVM - Kernel Tricks - Vectorial Kernels - Defining Kernels - Multiple Kernel Learning - Kernel machines for Regression - Kernel machines for Ranking - One-class Kernel Machines - Large Margin Nearest Neighbor Classifier - Kernal Dimensionality Reduction. **Graphical Models:** Introduction - Canonical Cases for Conditional Independence - Generative Models - d-Separation - Belief Propagation - Undirected Graphs: Markov Random Fields - Learning the Structure of a Graphical Model - Influence Diagrams. **Hidden Markov Models**: Introduction - Discrete Markov Processes - Hidden Markov Models - Three Basic Problems of HMMs - Evaluation Problem - Finding the State Sequence - Learning Model Parameters - Continuous Observations - The HMM as a Graphical Model - Model Selection in HMMs. **Bayesian Estimation:** Introduction - Bayesian Estimation of the Parameters of a Discrete Distribution - Bayesian Estimation of the Parameters of a Gaussian Distribution - Bayesian Estimation of the Parameters of a Function - Choosing a Prior - Bayesian Model Comparison - Bayesian Estimation of a Mixture Model - Nonparametric Bayesian Modeling - Gaussian Processes - Dirichlet Processes and Chinese Restaurants - Latent Dirichlet Allocation - Beta Processes and Indian Buffets. **(15 Hours)**

UNIT V

Combining Multiple Learners: Rationale - Generating Diverse Learners - Model Combination Schemes - Voting - Error-Correcting Output Codes - Bagging - Boosting - The Mixture of Experts Revisited - Stacked Generalization - Fine-Tuning an Ensemble - Cascading. **Reinforcement Learning:** Introduction - Single State

Case: K-Armed Bandit - Elements of Reinforcement Learning - Model-Based Learning - Temporal Difference Learning - Generalization - Partially Observable States. **Design and Analysis of Machine Learning Experiments:** Introduction - Factors , Response, and Strategy of Experimentation - Response Surface Design - Randomization, Replication, and Blocking - Guidelines for Machine Learning Experiments - Cross-Validation and Resampling Methods - Measuring Classifier Performance - Interval Estimation - Hypothesis Testing - Assessing a Classification Algorithm's - Comparing Two Classification Algorithms - Comparing Multiple Algorithms: Analysis of Variance-Comparison over Multiple Datasets - Multivariate Tests. **(15 Hours)**

BOOK FOR STUDY:

- **"Introduction to Machine Learning"**, Ethem Alpaydin, Third Edition, MIT Press, 2015.

UNIT I	**:**	Chapters	:1.1 - 1.2, 2.1 - 2.8,3.1 - 3.5, 4.1 - 4.8, 5.1 - 5.7
UNIT II	**:**	Chapters	:6.1-6.12, 7.1-7.9, 8.1-8.7, 9.1-9.6
UNIT III	**:**	Chapters	:10.1-10.9, 11.1-11.8, 12.1-12.9
UNIT IV	**:**	Chapters	:13.1-13.14, 14.1-14.8, 15.1-15.10, 16.1-16.12
UNIT V	**:**	Chapters	:17.1-17.11, 18.1-18.7, 19.1-19.14

BOOKS FOR REFERENCE:

1. **"Machine Learning",** Peter Flach, Cambridge University Press, MIT Press, 2019.
2. **"Machine Learning in Action",** P. Harrington, Manning Publications, Dreamtech Press, 2018.

INDUSTRY BASED PROJECT

Semester: IV **Hours: 20**

Code : 20PCS4R01 **Credits: 11**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Acquire practical knowledge within the chosen area of technology for project development.	PSO - 2	AP
CO - 2	Applyknowledge of computing and information technologies to produce effective designs and solutions for specific computer-based problems.	PSO - 2, PSO - 4	AP
CO - 3	Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach.	PSO - 2, PSO - 5	AN
CO - 4	Describe the impact upon society of computers, and the technical and human aspects of this impact.	PSO - 3, PSO - 4	AP
CO - 5	Effectively communicate during project development and present results for the area of concentration.	PSO - 5	AP

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Semester: IV				**INDUSTRY BASED PROJECT**							**Hours: 20**
Code : 20PCS4R01											**Credits: 11**
Course Outcomes	**Programme Outcomes (PO)**						**Programme Specific Outcomes (PSO)**					**Mean Score of CO's**
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	
CO - 1	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 2	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 3	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 4	3	3	3	3	3	3	4	4	4	4	4	3.45
CO - 5	3	3	3	3	3	3	4	4	4	4	4	3.45
Overall Mean Score												**3.45**

Result: The Score for this Course is: **3.45** (High Relationship)

Note:

Mapping	1-20%	21 - 40%	41 - 60%	61 - 80%	81 - 100%
Scale	1	2	3	4	5
Relation	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of Cos = Total of Values / Total No. of Pos & PSOs	Mean Overall Score for Cos= Total of Mean Scores / Total No. of Cos