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.

M.Sc. COMPUTER SCIENCE (2023-2026)

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POST GRADUATE DEPARTMENT OF COMPUTER SCIENCE

M. Sc. COMPUTER SCIENCE SYLLABUS

With effect from 2023 - 2026

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As per the guidelines of the University Grant Commission (UGC), Tamil Nadu State Council for Higher Education (TNSCHE) and Mother Teresa Women's University, Kodaikanal and 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.

Candidate's eligibility for Admission

A candidate who has passed B.Sc. Computer Science / B.C.A / B.Sc. Computer Technology / B.Sc. Information Science degree of this University or of any other University accepted by the syndicate as equivalent as may be prescribed therefore shall be permitted to appear and qualify for the M.Sc. Computer Science degree examination of this University after a course of study of two academic years.

Internship cum Mini Project: During the summer holidays of the Second Semester, students should complete an **Internship cum Mini Project** and submit the report. **Viva-voce** will be conducted during the **Semester Lab Examination.**

Industry based Project: During the fourth semester, students will take up an **Industry based Project** for 60 working days. They will re-join the college after the completion of their project period. 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.

EXTRA CREDIT COURSE

SWAYAM Online Course: During the second semester, students should undergo a SWAYAM Online Course as Self-paced Learning and they have to submit the certificate to earn the credit.

For extra credit course, 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 ratio is:

Course	Internal	External	Total
Theory	25	75	**100**
Lab Courses	40	60	**100**
Internship Cum Mini Project	50	50	**100**
Industry based Project	50	50	**100**

CONTINUOUS INTERNAL ASSESSMENT COMPONENT (CIA)

THEORY

Component	Marks	Marks
Internal test I	40	
Internal test II	40	
Seminar / Online Quiz	10	Converted to 25
Assignment	5	
Attendance	5	
Total	**100**	**25**

Lab Courses		Internship Cum MINI PROJECT	
Component	**Mark**	**Component**	**Mark**
InternalTest (2)	15	Report Submission	25
Lab Work	10	Internal Guide Mark	25
Record	10	**Total**	**50**
Attendance	05		
Total	**40**		

Note: No Internal Minimum for the Lab Courses & Internship Cum Mini Project

CIA FOR Theory & Practical ((T+P) Combined Courses

Courses that are Theory & Practical ((T+P) Combined have 6 hours per week. **FOUR** hours will be given for Theory and **TWO** hours for Practical Classes. **Semester Examination will be conducted in the Theory part ALONE.** Practical will be evaluated Internally and the marks will be added as Lab Work in the CIA. The students will write the Theory Internal exam (40 marks) for 2 hours and semester examination (75 marks) for 2 .30 Hrs.

Component	Marks	Marks
Theory - Internal test I	40	
Theory - Internal test II	40	Converted to 25
Lab Work	15	
Attendance	5	
Total	**100**	**25**

EXTERNAL QUESTION PAPER PATTERN for LAB COURSES

Time duration: 3 Hours and Max. Marks: 60.

DISTRIBUTION OF THE MARKS

Lab Courses		Internship Cum MINI PROJECT	
Component	**Mark**	**Component**	**Mark**
Problem Understanding	**20**	Joint Viva-voce - 50 (Internal Examiner 25 and External Examiner 25)	50
Implementation	20		
Debugging and Modification	10	**Total**	**50**
For correct output and viva	10		
Total	**60**		

INDUSTRY BASED PROJECT

Internal Components		External Evaluation	
Components	**Marks**	**Components**	**Marks**
First Review	10	Project Report Evaluation by External Examiner	25
Second Review	10		
Final Review (Internal Viva Voce)	30	Internal Examiner and External Examiner Joint Viva-voce	25
Total	**50**	**Total**	**50**

PASSING MINIMUM

Semester Examination		
Theory	50% out of 75 Marks (i.e. 37.5 Marks)	50% out of 100 Marks (i.e. 50 Marks)
Lab Courses	50% out of 60 Marks (i.e. 30 Marks)	

TRAINING FOR COMPETITIVE EXAMS (INTERNAL ONLY)

COMPONENTS	MAXIMUM MARKS
Test 1	40
Test 2	40
Panel Discussion	15
Class Activity	05

TEST TYPE	K LEVEL	NO OF QUESTIONS
Objective type questions	KI	15
Objective type questions	K2	15
Objective type questions	K3	10

Max. Marks - 40;   **Duration - 2 Hours**

Section	Bloom's level	Course Outcome	Questions
A MCQs (10×1=10)	K1	CO1	1.
		CO1	2.
		CO1	3.
		CO1	4.
		CO1	5.
		CO1	6.
		CO1	7.
		CO1	8.
		CO1	9.
		CO1	10.
B Answer all the Questions (2×5=10)	K2	CO2	11. a) (or) 11. b)
	K3	CO3	12. a) (or) 12. b)
C Answer all the questions (2×10=20)	K4	CO4	13. a) (or) 13. b)
	K5, K6	CO5	14. a) (or) 14. b)

PG - INTERNAL QUESTION PATTERN (FULLY INTERNAL PAPERS)

Max. Marks - 40;   **Duration - $1\frac{1}{2}$ Hours**

Section	Bloom's level	Course Outcome	Questions
A MCQs (10×1=10)	K1	CO1	1.
		CO1	2.
		CO1	3.
		CO1	4.
		CO1	5.
		CO1	6.
		CO1	7.
		CO1	8.
		CO1	9.
		CO1	10.
B Answer all the Questions (2×5=10)	K2	CO2	11. a) (or) 11. b)
	K3	CO3	12. a) (or) 12. b)
C Answer all the questions (2×10=20)	K4	CO4	13. a) (or) 13. b)
	K5, K6	CO5	14. a) (or) 14. b)

PG - EXTERNAL QUESTION PATTERN

For Credits 5 and above

Sections	Bloom's level	Course Outcome	Questions
A MCQs 15×1=15	K1	CO1	1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12
			13
			14
			15
B Answer All the Questions 5×2=10	K2	CO2	16
			17
			18
			19
			20
C Answer ALL the Questions 5×5=25	K1	CO1	21. a)
			Or
			21. b)
	K2	CO2	22. a)
			Or
			22. b)
	K3	CO3	23. a)
			Or
			23. b)
	K4	CO4	24. a)
			Or
			24. b)
	K5	CO5	25. a)
			Or
			25. b)

D Answer All the Questions 5×10=50	K2	CO2	26. a)
			Or
			26. b)
	K3	CO3	27. a)
			Or
			27. b)
	K4	CO4	28. a)
			Or
			28. b)
	K5	CO5	29. a)
			Or
			29. b)
	K6	CO5	30. a)
			Or
			30. b)

For Below 5 Credits

Sections	Bloom's level	Course Outcome	Questions
A MCQs 15×1=15	K1	CO1	1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12
			13
			14
			15
B Answer ALL the Questions 5×6=30	K2	CO2	16. a)
			Or
			16. b)
	K3	CO3	17. a)
			Or
			17. b)
	K4	CO4	18. a)
			Or
			18. b)
	K5	CO5	19. a)
			Or
			19. b)
	K6	CO5	20. a)
			Or
			20. b)
C Answer All the Questions 3×10=30	K2	CO2	21. a)
			Or
			21. b)
	K4	CO4	22. a)
			Or
			22. b)
	K5	CO5	23. a)
			Or
			23. b)

Note: Revised Bloom's Taxonomy Levels

K1-Remember; **K2**-Understand; **K3** -Apply; **K4** -Analyze; **K5** -Evaluate; **K6** -Create

P. G. PROGRAMME OUTCOMES

PO. NO.	UPON COMPLETION OF THIS PROGRAMME THE STUDENTS WILL BE ABLE TO
1.	Instil knowledge and evaluate analytically in their specific disciplines.
2.	Analyse and apply the acquired knowledge to solve the complex problems in professional and social life.
3.	Evolve new technologies in the specific discipline leading to innovation and employability.
4.	Develop critical thinking required to pursue research.
5.	Apply the computational and life skills to the challenging problems in life.
6.	Design and develop independent projects.

PROGRAMME SPECIFIC OUTCOMES

PSO. NO.	UPON COMPLETION OF THIS PROGRAMME THE STUDENTS WILL BE ABLE TO	PO Mapped
1.	Enrich knowledge on the emerging technologies through immersive learning and exploration.	PO1
2.	Develop the skill set for industry ready professionals and acquire flair on solving real world case studies.	PO4
3.	Competence to identify, analyze, design, optimize and implement system solutions using contemporary computing techniques.	PO2
4.	Empower the students with domain knowledge and adequate skills for employability and entrepreneurship and beneficial to the society.	PO3, PO5
5.	Pursue learning the cutting-edge developments in computing technology and contribute through socially relevant areas of research.	PO6

M.SC. COMPUTER SCIENCE COURSE PATTERN

Sem.	Part	Code	Paper	Hours	Credit
I	A	23PCS1C01	Statistical Computing	4	4
		23PCS1C02	Linux and Shell Programming	4	4
		23PCS1C03	Python Programming	4	4
		23PCS1P01	Linux and Shell Programming - Lab	3	1
		23PCS1P02	Python Programming - Lab	3	2
		23PCS1E1A 23PCS1E1B 23PCS1E1C	Data Engineering and Management (T+P) Network Protocols (T+P) Dot Net Technologies (T+P)	4+2	3
		23PCS1SE1	**SEC - 1:** Theory of Computation	4	2
	B	23PAE1SK1	**AEC - 1:** Soft Skill	2	2
			Total	**30**	**22**
II	A	23PCS2C04	Cryptography and Network Security	4	4
		23PCS2C05	Design and Analysis of Algorithms	4	4
		23PCS2C06	Internet of Things	4	4
		23PCS2P03	Design and Analysis of Algorithms - Lab	3	2
		23PCS2P04	Internet of Things - Lab	3	1
		23PCS2ID1	**IDC: (S → S)** Data Analytics using R	6	3
	B	23PCS2SE2	**SEC-2:** Big Data Analytics	4	2
		23PAE2SK2	**AEC- 2:** Cyber Security	2	2
	C	23PSL2EX1	Extension Activity	-	1
			Total	**30**	**23**
III	A	23PCS3C07	Advanced Java Programming	4	4
		23PCS3C08	Advanced Machine Learning Technologies	4	4
		23PCS3C09	Web Technologies	4	4
		23PCS3P05	Advanced Java Programming - Lab	3	2
		23PCS3P06	Machine Learning Technologies - Lab	3	1
		23PCS3E2A 23PCS3E2B 23PCS3E2C	Soft Computing (T+P) Software Development Technologies (T+P) Social Networks (T+P)	4+2	4
	B	23PCS3SE3	**SEC-3:** Mobile Computing	6	3
		23PCS3IN1	Internship Cum Mini Project	-	2
			Total	**30**	**24**
IV	A	23PCS4C10	Natural Language Processing	6	4
		23PCS4E3A 23PCS4E3B 23PCS4E3C	Solution Architecture (T+P) Block Chain Technologies (T+P) Optimization Techniques (T+P)	4+2	3
		23PCS4R01	Industry Based Project	16	14
		23PCS4SE4	**SEC-4:** Training for Competitive Examinations	2	1
			Total	**30**	**22**
			Total for all Semesters	**120**	**91**

Extra Credit

SWAYAM Online Course   -   2*

STATISTICAL COMPUTING

Semester: I   **Hours:4**

Code   : 23PCS1C01   **Credit: 4**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Recall probability, correlation, curve fitting and regression analysis, chi-square distribution and theory of estimation	PSO-1	K1
CO-2	Summarize probability, correlation, curve fitting and regression analysis, chi-square distribution and theory of estimation	PSO-4	K2
CO-3	Apply probability, correlation, curve fitting and regression analysis, chi-square distribution and theory of estimation	PSO-3	K3
CO-4	Correlate probability, correlation, curve fitting and regression analysis, chi-square distribution and theory of estimation	PSO-2	K4
CO-5	Solve problems in probability, correlation, curve fitting and regression analysis, chi-square distribution and theory of estimation	PSO-5	K5, K6

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES PROGRAMME SPECIFIC OUTCOMES

Semester: I						STATISTICAL COMPUTING					Hours: 4
Code : 23PCS1C01											Credit: 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	5	3	4	3	4	3	5	3	3	4	3	3.64
CO-2	4	3	5	3	5	3	4	3	3	5	3	3.73
CO-3	2	5	3	3	3	3	2	3	5	3	3	3.18
CO-4	2	3	3	5	3	3	2	5	3	3	3	3.18
CO-5	4	3	3	4	3	5	4	4	3	3	5	3.73
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

Theory of Probability: Introduction – Short History – Basic Terminology – Mathematical (or Classical or' A Priori) Probability – Statistical (Empirical) Probability – **Random Variables and Distribution Functions**: Introduction – Distribution Function Discrete Random Variable – Continuous Random Variable – Two dimensional Random Variables. **(12 Hours)**

UNIT II

Correlation: Introduction - Meaning of Correlation – Scatter Diagram - Karl Pearson Coefficient of Correlation - Calculation of the Correlation Coefficient for a Bivariate Frequency Distribution - Probable Error of Correlation Coefficient - Rank Correlation. **(12 Hours)**

UNIT III

Curve fitting and Regression Analysis: Introduction – Linear Regression – Curvilinear Regression - Regression Curves - Correlation Ratio - Intra-class Correlation. **(12 Hours)**

UNIT IV

Exact Sampling Distributions -I (Chi-square (χ^2) Distribution): Introduction – Derivation of the Chi-square (χ^2) Distribution – Applications of Chi-square Distribution - **Exact Sampling Distributions -II (t, F and Z Distributions):** Applications of t-Distribution - Distribution of Sample Correlation Coefficient when Population correlation Coefficient, p=0 (Sawkin's method) – Application of F-Distribution. **(12 Hours)**

UNIT V

Statistical Inference – I (Theory of Estimation): Introduction – Characteristics of Estimators - **Statistical Inference – II (Testing of Hypothesis and Non-parametric Methods):** Introduction – Statistical Hypothesis – Simple and Composite – Steps in solving Testing of Hypothesis problem – Optimum Test Under Different Situations. **(12 Hours)**

BOOK FOR STUDY:

"Fundamentals of Mathematical Statistics", S.C. Gupta and V. K. Kapoor, Twelfth Edition Sultan Chand & Sons Publications, New Delhi, Reprint 2022

Unit I	: Chapters: 3.1 – 3.5, 5.1- 5.5.
Unit II	: Chapter:10.1 – 10.7
Unit III	: Chapter:11.1 – 11.6
Unit IV	: Chapters:15.1-15.2, 15.6, 16.3 – 16.4, 16.7
Unit V	: Chapter: 17.1-17.2, 18.1 – 18.4

BOOKS FOR REFERENCE:

1. **"Statistical Methods: An Introduction to Basic Statistical Concepts and Analysis"** Cheryl Ann Willard, Taylor and Francis Publication, Second Edition, 2020.
2. **"Statistical Methods"**, S.P. Gupta, First Revised Edition, Sultan Chand & Sons Publication, 2011

WEB RESOURESES

1. https://onlinecourses.nptel.ac.in/noc23_ma77/preview
2. https://onlinecourses.nptel.ac.in/noc23_ma83/preview
3. https://www.coursera.org/learn/stanford-statistics
4. https://www.udemy.com/course/statistics-intro/
5. https://www.udemy.com/course/statistics-for-data-science-data-analytics/

LINUX AND SHELL PROGRAMMING

Semester: I		Hours: 4
Code : 23PCS1C02		Credit: 4

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Recall bash shell and structured commands, functions, regular expressions, alternative shells and script utilities	PSO-1	K1
CO-2	Comprehend bash shell and structured commands, functions, regular expressions, alternative shells and script utilities	PSO-2	K2
CO-3	Apply bash shell and structured commands, functions, regular expressions, alternative shells and script utilities	PSO-5	K3
CO-4	Analyze and review bash shell and structured commands, functions, regular expressions, alternative shells and script utilities	PSO- 3	K4
CO-5	Illustrate bash shell and structured commands, functions, regular expressions, alternative shells and script utilities	PSO-4	K5, K6

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

Semester: I												Hours: 4
Code : 23PCS1C02	LINUX AND SHELL PROGRAMMING											Credit: 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	5	3	3	3	3	4	5	3	3	3	4	3.55
CO - 2	3	3	4	5	4	3	3	5	3	4	3	3.64
CO - 3	3	3	4	2	4	5	3	2	3	4	5	3.45
CO - 4	3	5	4	3	4	3	3	3	5	4	3	3.64
CO - 5	3	3	5	2	5	3	3	2	3	5	3	3.36
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

Basic bash Shell Commands: Interacting with the base Manual-Navigating the file system-Listing files and directories-Handling Files-Managing directories - Viewing file contents. **Basic Script Building:** Using multiple commands-Creating a script file-Displaying messages - Using variables - Redirecting input and output-Pipes-Performing math - Exiting the script. **Using Structured Commands:** Working with the if-then statement-Nesting Ifs - Trying the test command-Considering compound Testing conditions - Using double parentheses - Using double brackets - Considering the case Command. **(12 Hours)**

UNIT II

More Structured Commands: The for statement- The while command-The until command-Nesting loops - Controlling the loops-Processing the output of a loop. **Handling User Input:** Passing parameters - Being shifty - Working with options-Standardizing options - Getting user input. **Script Control:** Handling signals - Running scripts in the background-Running Scripts without Hang-Up -Controlling a Job. **(12 Hours)**

UNIT III

Creating Functions: Basic script functions-Returning a value-Using variables in functions-Array and variable functions-Function recursion-Creating a library-Using functions on the command line. **Writing Scripts for Graphical Desktops:** Creating text menus-Doing windows widgets-**Introducing Sed and gawk:** Getting to know the Sed Editor-Getting to know the gawk program-commanding at the Sed Editor basics. **(12 Hours)**

UNIT IV

Regular Expressions: What Are regular expressions-Extended regular expressions. **Advanced sed:** Looking at multiline commands-Holding space - Negating a command-Changing the flow-Replacing via a pattern-placing sed commends in scripts-Creating sed utilities. **Advanced gawk:** Using variables - Using structured commands-Formatting the printing-Built-In function-User-defined function. **(12 Hours)**

UNIT V

Working with Alternative Shells: What is the dash shell-Scripting in dash-The zsh shell-scripting with zsh. **Writing Simple Script Utilities:** Performing Archives-Managing user accounts-Monitoring disk space. **Producing Scripts for Database, Web, and E-Mail:** Using MySQL Database-Using the web-Using E-Mail. **(12 Hours)**

BOOKS FOR STUDY

1. **"Linux Command Line and Shell Scripting BIBLE",** Richard Blum, Christine Bresnahan, Wiley Publishing, 3rd Edition, 2015.

Unit I	:	Chapters 3, 11 -12
Unit II	:	Chapters 13, 14, 16
Unit III	:	Chapters: 17, 18, 19
Unit IV	:	Chapters: 20, 21, 22
Unit V	:	Chapters: 23, 24, 25

2. **"Introduction to Linux and Shell Scripting",** Amalorpavam G, M.T. Somashekara, K.R. Venugopal, Khanna Book Publishing Co. (P) LTD., 2023.

Unit V	:	Chapter: 14.

BOOKS FOR REFERENCE

1. **"Linux Shell Scripting Cookbook",** ClifFlynt, SarathLakshman, ShantanuTushar, Packt Publishing, 3rd Edition, 2017.
2. **"Shell Programming in Unix, Linux, and OS X",** Stephen G. Kochan, Patrick Wood, Addison Wesley Professional, 4th Edition, 2016.
3. **"Linux System Programming",** Robert Love, O'Reilly Media, Inc, 2013.
4. **"Advanced Programming in the UNIX environment",** W.R. Stevens, 2nd Edition, Pearson Education, 2013.

WEB RESOURESES

1. https://swayam.gov.in/explorer?searchText=LINUX+AND+SHELL+PROGRAMMING
2. https://www.udemy.com/course/linux-shell-scripting-projects/
3. https://www.udemy.com/course/linux-bash-shell-scripting-complete-guide-incl-awk-sed/
4. https://www.coursera.org/learn/hands-on-introduction-to-linux-commands-and-shell-scripting

PYTHON PROGRAMMING

Semester: I   **Hours: 4**

Code   : 23PCS1C03   **Credit: 4**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Aquire the basic knowledge of data types, expressions, strings, text files, classes, numpy library and django	PSO -1	K1
CO - 2	Describe data types, expressions, strings, text files, classes, numpy library and Django	PSO - 2	K2
CO - 3	Illustrate data types, expressions, strings, text files, classes, numpy library and Django	PSO-5	K3
CO - 4	Evaluate data types, expressions, strings, text files, classes, numpy library and Django	PSO-4	K4
CO - 5	Design applications using data types, expressions, strings, text files, classes, numpy library and django	PSO-3	K5, K6

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

Semester: I						PYTHON PROGRAMMING					Hours: 4
Code : 23PCS1C03											Credit: 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	5	3	4	3	4	3	5	3	3	4	3	3.64
CO - 2	4	3	3	5	3	3	4	5	3	3	3	3.55
CO - 3	3	3	4	3	4	5	3	3	3	4	5	3.64
CO - 4	3	3	5	3	5	3	3	3	3	5	3	3.55
CO - 5	3	5	3	3	3	4	3	3	5	3	4	3.55
Overall Mean Score												**3.59**

Result: The score for this course is **3.59** (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 = <u>   Total of Values   </u>
                         Total No. of POs & PSOs
	Mean Overall Score for COs= <u> Total of Mean Scores </u>
	                              Total No. of COs

UNIT I

Introduction: Two Fundamental ideas of Computer Science - **Software Development, Data types and Expressions:** Strings, Assignment, and Comments - Numeric Data types and Character sets - Expressions - **Loops and Selection Statements:** Definite iteration: the for Loop - selection: if and if-else statements - Conditional iteration: the while Loop. **(12 Hours)**

UNIT II

Strings and Text Files: Accessing Characters and substrings in strings - Data encryption - Strings and Number systems- String methods - Text files. **Lists and Dictionaries:** Lists - Dictionaries - **Design with Functions:** A Quick review - Problem Solving with top-Down Design - Design with recursive Functions - Managing a Program's namespace - Higher-Order Functions. **(12 Hours)**

UNIT III

Design with Classes: Getting inside Objects and Classes - Data-Modeling Examples - Building a New Data Structure: The Two - Dimensional Grid - Structuring Classes with Inheritance and Polymorphism. **Graphical User Interfaces** - The Behavior of terminal-Based programs and GUI-Based programs - Coding Simple GUI-Based programs - Windows and Window Components - Command Buttons and responding to events. **(12 Hours)**

UNIT IV

The NumPy Library: Ndarray: The heart of the Library - Basic Operations - Indexing, Slicing and Iteration - Array manipulation. **The Pandas Library-An Introduction**: The Series - The DataFrame - The Index Objects. **Data Visualization with Matplotlib:** The Matplotlib Architecture - pyplot - The Plotting Window - Adding Elements to the Chart - Line Charts - Bar Charts - Pie charts. **(12 Hours)**

UNIT V

Installing Python and Django: Installing Django - Starting a Project - Creating a database - The development Server - **Your First Django Application:** Django Project Structure - Django applications - **Creating the Page Model:** The page model - A first look at the Django Admin - **Django Templets:** Template settings - Site Template and Static files - Django's Generic Views: Viewing records with list view - viewing a single record with detailed view - create the detailed view.

(12 Hours)

BOOKS FOR STUDY

1. **"Fundamentals of Python: first programs",** K.A. Lambert, Second Edition, Cengage Learning, 2018.

   Unit I   :   Chapters 1-3

   Unit II   :   Chapters 4-6

   Unit III   :   Chapters 9, 8

2. **"Python Data Analytics: With Pandas, NumPy, and Matplotlib",** Fabio Nelli Second Edition, Kindle Edition, 2018.

   Unit IV   :   Chapters 3, 4, 7

3. **"Build a Website with Django 3: A complete introduction to Django 3",** Nigel George, GNW Independent Publishing, 2019.

   Unit V   :   Chapters 4, 6 - 8, 12

BOOKS FOR REFERENCE

1. **"Introduction to computing & Problem Solving with Python ",** Jeeva Jose, P. Sojan Lal, Khanna Book Publishing Co. (P) LTD., 2020.

2. **"Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython",** William McKinnery, O'Reilly, Second Edition, 2017.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc23_cs99/preview

2. https://www.udemy.com/course/python-beginner-to-advanced-level-course/

3. https://www.coursera.org/specializations/python

4. https://www.coursera.org/learn/python-crash-course

5. https://www.udemy.com/course/python-coding/

6. https://www.coursera.org/learn/codio-advanced-django-advanced-drf

LINUX AND SHELL PROGRAMMING - LAB

Semester: I   **Hours: 3**

Code   : 23PCS1P01   **Credit: 1**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Acquire the knowledge of Shell scripting to solve simple programs	PSO - 1	K1
CO - 2	Understand a problem and identify the network controls for its solutions	PSO - 2	K2
CO - 3	Develop Dynamic Programming algorithm to meet Shell Script functions	PSO - 4	K3
CO - 4	Analyze file backup process by creating a daily archive location	PSO - 3	K4
CO - 5	Evaluate PostgreSQL database and perform CRUD operations	PSO - 5	K5, K6

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

Semester: I											Hours: 3
Code : 23PCS1P01			LINUX AND SHELL PROGRAMMING - LAB								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	3	3	4	3	3	5	4	3	3	3	3.55
CO - 2	4	3	3	5	3	3	4	5	3	3	3	3.55
CO - 3	3	3	5	3	5	4	3	3	3	5	4	3.73
CO - 4	3	5	4	3	4	3	3	3	5	4	3	3.64
CO - 5	3	3	3	3	3	5	3	3	3	3	5	3.36
Overall Mean Score												3.57

Result: The score for this course is **3.57** (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

Write Shell Script program to do the following:

1. Calculate the number of days between two dates.

2. Check systems on local network using control structures with user input.

3. Check systems on local network using control structures with file input.

4. Demonstrate the script control commands.

5. Demonstrate the Shell script function.

6. Demonstrate the Regular Expressions.

7. Demonstrate the sed and awk Commands.

8. Demonstrate the File Backup process through creating a daily archive location.

9. Create a following GUI tools.

   a) Creating text menus

   b) Building text window widgets

10. Demonstrate to connect a PostgreSQL database and performing CRUD operations.

PYTHON PROGRAMMING - LAB

Semester: I   **Hours: 3**
Code   : 23PCS1P02   **Credit: 2**
COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Acquire the basic knowledge of elementary data items, lists, dictionaries, loops, functions, objects, numpy, Pandas and Matlab	PSO - 1	K1
CO - 2	Identify the elementary data items, lists, dictionaries, loops, functions, objects, numpy, Pandas and Matlab	PSO - 3	K2
CO - 3	Apply the elementary data items, lists, dictionaries, loops, functions, objects, numpy, Pandas and Matlab in python	PSO - 4	K3
CO - 4	Analyze the elementary data items, lists, dictionaries, loops, functions, objects, numpy, Pandas and Matlab in Python	PSO - 2	K4
CO - 5	Create python programming using lists, dictionaries, loops, functions, objects, numpy, Pandas and Matlab	PSO - 5	K5, K6

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

Semester: I							PYTHON PROGRAMMING - LAB					Hours: 3
Code : 23PCS1P02												Credit: 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	5	3	3	4	3	4	5	4	3	3	4	3.73
CO - 2	4	5	3	3	3	3	4	3	5	3	3	3.55
CO - 3	3	4	5	3	5	3	3	3	4	5	3	3.73
CO - 4	4	3	4	5	4	3	4	5	3	4	3	3.82
CO - 5	3	3	3	3	3	5	3	3	3	3	5	3.36
Overall Mean Score												3.64

Result: The score for this course is **3.64** (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

Write Python program to do the following:

1. Program using elementary data items, lists, dictionaries and tuples

2. Program using conditional branches, loops

3. Program using functions

4. Program using classes and objects

5. Program using inheritance

6. Program using Numpy

7. Program using Pandas

8. Program using Matplotlib

Semester: I   **Hours: 4+2**

Code   : 23PCS1E1A   **Credit: 3**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Recall Database management, corporate data modelling, data quality, data Accessibility, customer relationship and life cycle	PSO-1	K1
CO - 2	Interpret Database management, Corporate data modelling, data quality, data Accessibility, customer relationship and life cycle	PSO-2	K2
CO - 3	Develop Database management, corporate data modelling, data quality, data Accessibility, customer relationship and life cycle	PSO-3	K3
CO - 4	Analyse Database management, Corporate data modelling, data quality, data Accessibility, customer relationship and life cycle	PSO-4	K4
CO - 5	Evaluate Database management, Corporate data modelling, data quality, data Accessibility, customer relationship and life cycle	PSO-5	K5, K6

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

Semester: I							DATA ENGINEERING AND MANAGEMENT					Hours:4+2	
Code : 23PCS1E1A												Credit: 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	5	3	2	4	2	2	5	4	3	2	2	3.09	
CO - 2	3	3	3	5	3	2	3	5	3	3	2	3.18	
CO - 3	2	5	4	3	4	3	2	3	5	4	3	3.45	
CO - 4	3	3	5	3	5	2	3	3	3	5	2	3.36	
CO - 5	3	3	3	4	3	5	3	4	3	3	5	3.55	
Overall Mean Score												3.33	

Result: The score for this course is **3.33** (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

Theory **(4 X 15 = 60 Hrs)**

UNIT I

Database Development: The Database architecture of an information system - An overview of the database development process - Conceptual data modelling - Relational data analysis - The roles of a data model - Physical database design. **Data Management:** The problems encountered without data management - Data management responsibilities - Roles within data management - The Benefits of data management - Relationship between data management and enterprise architecture. **(12 Hours)**

UNIT II

Corporate Data Modelling: Why Develop a corporate data model? - More data modelling Concepts - The Nature of a corporate data model - How to Develop a corporate data model - Corporate data model principles. **Data Definition and Naming Conventions:** The elements of a data definition - Data naming conventions. **Data Quality:** Issues associated with poor-data quality - The causes of poor-quality data - The dimensions of data quality - Data model quality - Improving data quality. **(12 Hours)**

UNIT III

Data Accessibility: Data Security - Data Integrity - Data recovery. **Database Administration:** Database administration responsibilities - Performance monitoring and tuning. **Industry Trends and their Effects on Data Management:** The use of packages - Distributed data and databases - Data warehousing and data mining - Object orientation and databases - Multimedia and databases - Data and web technology. **(12 Hours)**

UNIT IV

Understanding Customer relationships: Introduction to CRM- Strategic CRM - Operational CRM - Analytical CRM - Defining CRM - CRM constituencies - Commercial contexts of CRM - Models of CRM. **Understanding relationships:** What is a Relationship? - Relationship quality - Customer lifetime value. **Managing the customer lifecycle - customer retention and development:** What is Customer retention? - Economics of customer retention - Strategies for customer retention - Strategies for customer development. **(12 Hours)**

UNIT V

Realizing the Benefits of CRM: Planning to Succeed: - The logic of business case - Organizing the benefits - Network and virtual organizations - Person-to-person contacts - Key account management. **Implementing CRM:** Develop the CRM strategy - Build CRM project foundations - Needs specification and partner selection - Project implementation - Performance evaluation. **(12 Hours)**

Practical: **(2 X 15 = 30 Hrs)**

Write MangoDB Script for:

1. Create a MongoDB database and perform insert operation

2. Perform query operations - Perform update operations

3. Update documents with aggregation pipeline

4. Delete single and multiple documents

5. Perform string aggregation operations

6. Design a Data Model for MongoDB using DbVisualizer

7. Perform CRUD operations using DbVisualizer

8. Create a Zoho CRM account and organize your Tasks, Meetings and Deals

9. Create and maintain a project using Zoho CRM features

BOOKS FOR STUDY

1. **"Principles of Data Management Facilitating Information Sharing"**, Keith Gordon, BCS, First South Asian Edition, 2008.

   Unit I   :   Chapters: 2, 3

   Unit II   :   Chapters: 4, 5, 7

   Unit III   :   Chapters: 8, 9, 12

2. **"Customer Relationship Management Concepts and Technologies"**, Francis Buttle and Stan Maklan, Routledge, Third Edition, Special Indian Edition 2016.

   Unit IV   :   Chapters: 1, 2, 4

   Unit V   :   Chapters: 13, 14

BOOKS FOR REFERENCE

1. **"Big Data Management Data Governance Principles for Big Data Analytics"**, Peter Ghavami, De Gruyter, 2020.

2. **"The Art of CRM"**, Max Fatouretchi, Packt Publishing, 2019.

3. "**Customer Relationship Management",** Ed. Peelen, Pearson Education, 2022.

4. **"Customer Relationship Management Emerging Concepts, Tools and Applications",** Jagdish N Sheth, Atul Parvatiyar, G Shainesh, McGraw Hill, 2022.

WEB RESOURCES

1. https://www.coursera.org/professional-certificates/ibm-data-engineer

2. https://www.coursera.org/specializations/data-engineering-foundations

3. https://www.coursera.org/learn/introduction-to-data-engineering

4. https://www.udemy.com/course/data-engineering-using-aws-analytics-services/

5. https://www.udemy.com/course/introduction-to-data-management-for-beginners/

NETWORK PROTOCOLS

Semester: I   **Hours: 4+2**

Code   : 23PCS1E1B   **Credit: 3**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Describe Transmission Control Protocol, Internet Architecture, IP Quality of Service, Virtual Private Wired Service, IP Traffic Engineering	PSO - 1	K1
CO - 2	Understand Transmission Control Protocol, Internet Architecture, IP Quality of Service, Virtual Private Wired Service, IP Traffic Engineering	PSO - 2	K2
CO - 3	Apply Transmission Control Protocol, Internet Architecture, IP Quality of Service, Virtual Private Wired Service, IP Traffic Engineering	PSO -4	K3
CO - 4	Analyze Transmission Control Protocol, Internet Architecture, IP Quality of Service, Virtual Private Wired Service, IP Traffic Engineering	PSO - 3	K4
CO - 5	Inspect Transmission Control Protocol, Internet Architecture, IP Quality of Service, Virtual Private Wired Service, IP Traffic Engineering	PSO - 5	K5, K6

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

Semester: I							NETWORK PROTOCOLS					Hours:4+2
Code : 23PCS1E1B												Credit: 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	5	3	4	3	4	3	5	3	3	4	3	3.64
CO - 2	3	3	3	5	3	3	3	5	3	3	3	3.36
CO - 3	3	3	5	3	5	4	3	3	3	5	4	3.73
CO - 4	3	5	3	3	3	3	3	3	5	3	3	3.36
CO - 5	4	3	3	3	3	5	4	3	3	3	5	3.55
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 = $\dfrac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	Mean Overall Score for COs= $\dfrac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Theory (4 X 15 = 60 Hrs)
UNIT I

Transmission Control Protocol/Internet Protocol: Fundamental Architecture - Internet Protocol Basics - Routing. **Transport-Layer Protocols:** Transmission Control Protocol - User Datagram Protocol - Stream Control Transmission Protocol - Real-Time Transport Protocol. **(12 Hours)**

UNIT II

Internet Architecture: Internet Exchange Point - History of Internet Exchange Points - Internet Service Provider Interconnection Relationships - Peering and Transit - **IP Routing Protocols:** Overview of Routing Protocols - Routing Information Protocol - Open Shortest Path First - Border Gateway Protocol - **Multiprotocol Label Switching**: Overview- Functions and Mechanisms-Applicabilities. **(12 Hours)**

UNIT III

IP Quality of Service: Introduction - Quality of Service in IP Version 4 - Integrated Services - Differentiated Services - Quality of Service with Nested Differentiated Services Levels. **IP Multicast and Any cast:** Addressing - Multicast Routing - Routing Protocols -Any casting- IPv6 Any cast Routing Protocol: Protocol Independent -Any cast - Sparse Mode. **Transport over Packet:** Draft-Martini Signaling and Encapsulation - Layer-2 Tunneling Protocol. **(12 Hours)**

UNIT IV

Virtual Private Wired Service: Types of Private Wire Services - Generic Routing Encapsulation - Layer-2 Tunneling Protocol - Layer-3 Virtual Private Network 2547bis, Virtual Router. **IP and Optical Networking:** IP/Optical Network Evolution - Challenges in Legacy Traditional IP/Optical Networks - Automated Provisioning in IP/Optical Networks - Control Plane Models for IP/Optical Networking - Next-Generation Multilayer Network Design Requirements - Benefits and Challenges in IP/Optical Networking. **IP Version 6:** Addresses in IP Version 6 - IP Packet Headers - IP Address Resolution- IP Version 6 Deployment: Drivers and Impediments.
(12 Hours)

UNIT V

IP Traffic Engineering: Models of Traffic Demands - Optimal Routing with Multiprotocol Label Switching - Link-Weight Optimization with Open Shortest Path First - Extended Shortest-Path-Based Routing Schemes. **IP Network Security:** Introduction - Detection of Denial-of-Service Attack - IP Trace back- Edge Sampling Scheme - Advanced Marking Scheme. **Mobility Support for IP:** Mobility Management Approaches - Security Threats Related to IP Mobility - Mobility Support in IPv6 - Reactive Versus Proactive Mobility Support - Relation to Multihoming - Protocols Supplementing Mobility. **(12 Hours)**

Practical: **(2 X 15 = 30 Hrs)**

Implement the following using Linux / Windows environments

1. Implement the following commands
    a. ipconfig
    b. ping
    c. traceroute
    d. netsat
    e. nslookup
2. Implement the following server commands
    a. ifconfig
    b. ip
    c. tracepath
    d. ss
    e. tcpdum
3. Connect and place the given file in the FTP server
4. Install packet tracer and connect a computer to router, switch and get a ICMP request
5. Implement the SSH protocols and accessing the remote device
6. Connect any two switches and get the status of each switch.
7. Connect two routers and get packets from the routers.
8. Get the access of the router by connecting with working computer.
9. Identify the route password of server and get the connection using telnet.
10. Install Wireshark to capture and analyze the packets (TCP /UDP).

BOOK FOR STUDY

1. **"Advanced Internet Protocols, Services and Applications"**, Eiji Oki, Roberto Rojas-Cessa, Mallikarjun Tatipamula, Christian Vogt, Copyright © 2012 by John Wiley & Sons, Inc.

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

BOOKS FOR REFERENCE

1. **"TCP/IP Protocol Suite**", Behrouz A. Forouzan, Fourth Edition, Tata Mcgraw-Hill Edition 2010.

2. **"Data and Computer Communications",** William Stallings, Eighth Edition, Pearson Education.

3. **"Data communication and networks**", James Irvine and David Harley, Wiley India.

WEB RESOURCES

1. https://www.udemy.com/course/mastering-internet-protocol-ipv4-and-subnetting/

2. https://www.udemy.com/course/an-introduction-to-the-ethernetip-protocol/

3. https://www.udemy.com/course/complete-networking-fundamentals-course-ccna-start/

4. https://www.udemy.com/course/introduction-to-computer-networks/

5. https://www.coursera.org/learn/akamai-networking

6. https://www.coursera.org/learn/tcpip

DOT NET TECHNOLOGIES

Semester: I   **Hours: 4+2**

Code   : 23PCS1E1C   **Credit: 3**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Recall the basics of .NET Framework, variables and functions, cloud programming, ASP.NET, XML and JSON and Querying XML from a Database.	PSO-1	K1
CO - 2	Understand .NET Framework, variables and functions, cloud programming, ASP.NET, XML and JSON and Querying XML from a Database.	PSO-2	K2
CO - 3	Develop applications from the .NET Framework, variables and functions, cloud programming, ASP.NET, XML and JSON and Querying XML from a Database.	PSO-5	K3
CO - 4	Analyze .NET Framework, variables and functions, cloud programming, ASP.NET, XML and JSON and Querying XML from a Database.	PSO-4	K4
CO - 5	Evaluate and Create .NET Framework, variables and functions, cloud programming, ASP.NET, XML and JSON and Querying XML from a Database.	PSO-3	K5, K6

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

Semester: I							DOT NET TECHNOLOGIES					Hours:4+2
Code : 23PCS1E1C												Credit: 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	5	3	2	4	2	3	5	4	3	2	3	3.27
CO - 2	3	3	2	5	2	3	3	5	3	2	3	3.09
CO - 3	3	3	4	3	4	5	3	3	3	4	5	3.64
CO - 4	2	3	5	4	5	3	2	4	3	5	3	3.55
CO - 5	3	5	3	4	3	3	3	4	5	3	3	3.55
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

Theory   **(4 X 15 = 60 Hrs)**

UNIT I

Introducing C#: .NET Framework - C# language - Visual Studio 2017 - **Writing a C# Program:** Visual Studio 2017 Development Environment - Console Applications - Desktop Applications - **Variables and Expressions:** Basic C# Syntax - Basic C# Console Application Structure - Variables - Expressions - **Flow Control:** Boolean Logic - Branching - Looping.   **(12 Hours)**

UNIT II

More About Variables: Type Conversion - Complex Variable Types - String Manipulation - **Functions:** Defining and Using Functions - Variable Scope - The Main Function - Struct Functions - Overloading Functions - Using Delegates - **Debugging and Error Handling:** Debugging in Visual Studio - Error Handling - **Introduction to Object Oriented Programming:** Object-Oriented Programming - OOP Techniques - OOP in Desktop Applications.   **(12 Hours)**

UNIT III

Defining Classes: Class Definitions in C# - System. Object - Constructors and Destructors - OOP Tools in Visual Studio - Class Library Projects - Interfaces Versus Abstract Classes - Struct Types - Shallow Copying Versus Deep Copying - **Defining Class Members:** Member Definitions - Additional Class Member Topics - Interface Implementation - Partial Class Definitions - Partial Method Definitions - The Call Hierarchy Window - **Basic Cloud Programming:** Cloud, Cloud Computing, and the Cloud Optimized Stack - Cloud Patterns and Best Practices - Using Microsoft Azure C# Libraries to Create a Storage Container - Creating an ASP.NET 4.7 Web Site That Uses the Storage Container - **Advanced Cloud Programming and Deployment:** Creating an ASP.NET Web API - Deploying and Consuming an ASP.NET Web API on Microsoft Azure - Scaling an ASP.NET Web API on Microsoft Azure.   **(12 Hours)**

UNIT IV

.NET Standard and .NET Core: Cross-Platform Basics and Must Know Terms - Need of .NET - Referencing and Targeting Frameworks - .NET Core - Building and Packaging a.NET Standard Library - Building a .NET Core Application with Visual Studio - Porting from .NET Framework to .NET Core - **ASP.NET and ASP.NET Core:** Overview of Web Applications - Use of ASP.NET - ASP.NET Web Forms - Creating ASP.NET Core Web Applications - **Files:** File Classes for Input and Output - Streams - Monitoring the File System - **XML and JSON:** XML Basics - JSON Basics - XML Schemas - XML Document Object Model - Converting XML to JSON - Searching XML with XPath.   **(12 Hours)**

UNIT V

> **LINQ:** LINQ to XML - LINQ Providers - LINQ Query Syntax - LINQ Method Syntax - Ordering Query Results - Understanding the orderby Clause - Querying a Large Data Set -Using Aggregate Operators - Using the Select Distinct Query - Ordering by Multiple Levels -Using Group Queries - Using Joins - **Databases:** Using Databases - Installing SQL Server - Express - Entity Framework - Code First Database - Finding the Database - Navigating Database Relationships - Handling Migrations - Creating and Querying XML from an Existing Database - **Universal Apps:** Windows Universal Apps - App Concepts and Design - App Development - Common Elements of Windows Store Apps - Windows Store.   **(12 Hours)**

Practical: **(2 X 15 = 30 Hrs)**

Implement the following using Dot Net Technologies:

1. Demonstrate method overloading and method overriding

2. Class and Objects

3. Multilevel Inheritance

4. Interfaces

5. Demonstrate multiple type of Exceptions

6. Azure Storage Container Using the Microsoft Azure Storage Client Library

7. Demonstrate Read and Write a Data using Random Access Files

8. Employee management database using LINQ

9. Student management system using ASP.NET

10. Demonstrates simple Universal App.

BOOK FOR STUTY

1. **"Beginning C#7 Programming with Visual Studio 2017",** Benjamin Perkins, Jacob Vibe Hammer, Jon D. Reid, Wiley Publishing, 2018.

    Unit I   :   Chapters: 1-4.
    Unit II   :   Chapters: 5-8.
    Unit III   :   Chapters: 9,10,16,17.
    Unit IV   :   Chapters: 18-21.
    Unit V   :   Chapters: 22,23,25.

BOOKS FOR REFERENCE

1. **"Professional C 7 and .NET Core 2.0",** Nagel, Christian, Wrox Publishing, 2018.

2. **"C# 7 and .NET Core 2.0 High Performance",** Mehboob Ahmed Khan, Ovais, Packt Publishing, 2018.

WEB RESOURCES

1. https://www.udemy.com/course/build-an-app-with-aspnet-core-and-angular-from-scratch/

2. https://www.udemy.com/course/build-rest-apis-with-aspnet-core-web-api-entity-framework/

3. https://www.udemy.com/course/ultimate-aspnet-5-web-api-development-guide/

4. https://www.udemy.com/course/a-gentle-introduction-to-aspnet-web-forms-for-beginners/

5. https://www.coursera.org/learn/c-sharp-for-dot-net

THEORY OF COMPUTATION

Semester: I   **Hours: 4**

Code   : 23PCS1SE1   **Credit: 2**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Acquire the basic concepts of Language, Grammar and Turing Machine in TOC	PSO-1	K1
CO-2	Identify different Formal language Classes and their relationships, Grammar, Turing Machine in TOC	PSO-2	K2
CO-3	Design context free Grammars and lemma for CFL and Turing Machine	PSO-3	K3
CO-4	Analyze and construct the language, grammar and Turing Machine in TOC	PSO-4	K4
CO-5	Evaluate various languages, grammar, Turing machines, Determine the decidability and intractability of Computational problems.	PSO- 5	K5, K6

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

Semester: I											Hours: 4
Code : 23PCS1SE1	THEORY OF COMPUTATION										Credit: 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	5	3	2	3	2	3	5	3	3	2	3	3.09
CO - 2	4	3	3	5	3	3	4	5	3	3	3	3.55
CO - 3	3	5	4	3	4	3	3	3	5	4	3	3.64
CO - 4	2	3	5	3	5	2	2	3	3	5	2	3.18
CO - 5	3	3	3	4	3	5	3	4	3	3	5	3.55
Overall Mean Score												**3.40**

Result: The score for this course is **3.40** (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	Mean Overall Score for COs= Total of Mean Scores
Total No. of POs & PSOs	Total No. of Cos

UNIT I

Basic Terminology: Basics of String - Basics of Set Theory - History of automata Theory. **Language and Grammar**: Grammar - The Chomsky Hierarchy - **Finite Automata:** use of automata characteristics of automation - finite automata-graphical and tabular representation FA- Transitional system-DFA and NFA - conversion of NFA to DFA - conversion of one machine to another - minimization of finite automata - Two way finite automata. **(12 Hours)**

UNIT II

Finite state machine: Finite state machine -state equivalence and minimization of machine - incompletely specified machine- Minimal Machine - merger graph-merger table-finite memory and definite memory Machine. **Regular Expression:** Arden's theorem-construction of finite automata from regular expression.

(12 Hours)

UNIT III

Equivalence of two finite automata- Equivalence of two regular expression-construction of regular grammar from an RE- constructing FA from regular grammar-Pumping lemma for regular expression. **Context Free Grammar:** Definition of Context Free Grammar - derivation and parse tree-Ambiguity in context free grammar-left recursion and left factoring-linear grammar-normal form - pumping lemma for CFL - Ogden's lemma for CFL. **(12 Hours)**

UNIT IV

Push down automata: acceptance by a PDA- DPDA and NPDA-Construction of PDA from CFG-construction of CFG equivalent to PDA-Graphical notation for PDA. **Turing Machine**: Transactional representation of Turing machine - non deterministic Turing Machine - conversion of regular expression to Turing machine. **(12 Hours)**

UNIT V

Variations of the Turing machine: Variations of the Turing machine-turing machine as an integer function-Universal turing machine-linear bounded automata- **Computability and Undecidability:** undecidability- reducibility.

(12 Hours)

BOOK FOR STUDY

1. **"Introduction to Automata Theory, Formal Languages and Computation"**, Shyamlendu Kandar, First Edition, Pearson Education, 2013.

UNIT I	:	Chapters: 1.1,1.2, 1.8, 2.1,2.2, 3.2-3.8, 3.13,3.14, 3.16
UNIT II	:	Chapters: 4.3 - 4.9, 5.4, 5.5
UNIT III	:	Chapters: 5.7 - 5.11, 6.1 - 6.4, 6.6, 6.7, 6.9,6.10
UNIT IV	:	Chapters: 7.2 -7.6, 8.2- 8.4.
UNIT V	:	Chapters: 9.1 - 9.4, 10.5, 10.6.

BOOKS FOR REFERENCE

1. **"Introduction to Automata Theory, Languages and Computation"**, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman 3rd Edition, Pearson Education, 2011.

2. **"Introduction to Automata Theory, Languages, and Computation"**, John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, Pearson Education, 2012.

3. **"Theory of Computation**", Michael Sipser, Cengage Learning, India Edition, 2011.

WEB RESOURCES

1. https://www.udemy.com/course/theory-of-automata/

2. https://www.udemy.com/course/theory-of-computation-online-course/

3. https://www.udemy.com/course/the-complete-theory-of-computation/

4. https://www.udemy.com/course/introduction-to-automata-theory-languages-and-computation/

5. https://www.udemy.com/course/formal-languages-and-automata-theory/

SOFT SKILL

Semester: I   **Hours: 2**

Code   : 23PAE1SK1   **Credit: 2**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	State their short and long term goals	PSO - 1	K1
CO - 2	Associate their social, interpersonal, cognitive, ethical, professional, reading and communication skills	PSO-5	K2
CO - 3	Administer their self - esteem and confidence	PSO - 4	K3
CO - 4	Formulate their resumes wisely	PSO - 2	K4
CO - 5	Assess the mock group discussions and interviews with a challenge to choose their right career	PSO - 3	K5, K6

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

Semester: I												Hours: 2
Code : 23PAE1SK1			SOFT SKILL									Credit: 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	2	2	5	2	4	5	2	2	2	4	3.09
CO - 2	5	4	4	3	4	5	3	4	4	4	5	4.09
CO - 3	4	2	5	2	2	4	2	2	2	5	4	3.09
CO - 4	4	2	2	2	5	4	2	5	2	2	4	3.09
CO - 5	4	5	3	2	2	4	2	2	5	3	4	3.27
Overall Mean Score												3.33

Result: The score for this course is **3.33** (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: SOFT SKILLS-INTRODUCTION

What are soft skills? - Importance of Soft skills-Difference between hard skills and soft skills-Top 60 soft skills. SWOC analysis-Self-Discovery-Advantages of SWOC analysis-Identifying your soft skills. **(6 Hours)**

UNIT II: ATTITUDE AND PERCEPTION

what is attitude? -formation of attitudes-positive and negative attitudes -power of positive attitude-developing positive attitude-obstacles in developing positive attitudes-results of positive attitude-overcoming negative attitude and its impacts. Perception - factors influencing perception-changing and improving perception towards positive attitude. **(6 Hours)**

UNIT III: TIME AND STRESS MANAGEMENT

Value of time-Sense of time management-Difficulties in time management-Evils of not planning-Reasons for procrastination-Overcoming procrastination- Effective scheduling-Steps to and Tips for Time Management-Deciding upon priorities-Grouping activities. Stress-Definition -Causes of Stress-Effects of Stress-Signs of stress-Stress as appositive and negative reinforcer-spotting stress in you-Behaviours identified with stress- for stress management. **(6 Hours)**

UNIT IV: EMOTIONAL BALANCE-TEAM BUILDING AND LEADERSHIP QUALITIES

What is Emotional Intelligence? -Emotional IQ-Intellectual IQ-Why emotional balance is important-Benefits of Emotional IQ-Four important Elements of Emotional IQ-Control of your reaction to situation. Skills needed for teamwork-Role of a team leader-challenges faced in collaboration-advantages of team-spirit.

(6 Hours)

UNIT V: INTERVIEW SKILLS, GROUP DISCUSSION, PREPARING RESUME/CV

Types of interview-One to one Interview-Interview panel-Dress code at interview-punctuality-interview etiquettes-Group Discussion- Why group discussion-Types of group discussion-Skills required-GD Etiquette-Movement and gestures to be avoided-initiating a GD-Resolving conflicts. Preparing Resume/CV-Tips.**(6 Hours)**

COURSE BOOK:

❖ Dr. K. Alex, *Soft skills,* Chand & company Pvt. Ltd., New Delhi, 2010.

BOOK FOR REFERENCE:

❖ Kumar, Suresh, Sreehari and Savithri. *Communication Skills and Soft Skills: An Integrated Approach,* Pearson India, 2010.

INTERNAL QUESTION PATTERN

SOFT SKILL - 23PAE1SK1

INTERNAL COMPONENTS

Test 1	40
Test 2	40
Term Paper	5
Seminar	10
Attendance	5
Total	**100**

CRYPTOGRAPHY AND NETWORK SECURITY

Semester: II   **Hours: 4**

Code   : 23PCS2C04   **Credit: 4**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Relate the concepts of network security, encryption techniques, block cipher, hash functions and digital signatures	PSO-1	K1
CO - 2	Understand network security, encryption techniques, block cipher, hash functions and digital signatures	PSO-2	K2
CO - 3	Apply network security, encryption techniques, block cipher, hash functions and digital signatures	PSO-4	K3
CO - 4	Analyze network security, encryption techniques, block cipher, hash functions and digital signatures	PSO-3	K4
CO - 5	Evaluate network security, encryption techniques, block cipher, hash functions and digital signatures	PSO-5	**K5, K6**

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

Semester: II						CRYPTOGRAPHY AND NETWORK SECURITY					Hours: 4
Code : 23PCS2C04											Credit: 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	5	3	3	3	3	3	5	3	3	3	3	3.36
CO - 2	4	3	3	5	3	3	4	5	3	3	3	3.55
CO - 3	3	3	5	5	5	3	3	5	3	5	3	3.91
CO - 4	3	5	3	2	3	2	3	2	5	3	2	3.00
CO - 5	2	3	3	2	3	5	2	2	3	3	5	3.00
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

Computer and Network Security Concepts: Computer Security Concepts - The OSI Security Architecture - Security Attacks - Security Services - Security Mechanisms - A Model for Network Security. **Introduction to Number Theory:** Divisibility and the Division Algorithm - The Euclidean Algorithm - Modular Arithmetic. **(12 Hours)**

UNIT II

Classical Encryption Techniques: Symmetric Cipher Model - Substitution Techniques - Transposition Techniques - Rotor Machines - Steganography. **Block Ciphers and the Data Encryption Standard:** Traditional Block Cipher Structure - The Data Encryption Standard - The DES Example - The Strength of DES - Block Cipher Design Principles. **(12 Hours)**

UNIT III

Advanced Encryption Standard: AES Structure - AES Transformation Functions - AES Key Expansion. **Block Cipher Operation:** Multiple Encryption and Triple DES - **Random Bit Generation and Stream Ciphers:** Stream Ciphers - RC4. **Public-Key Cryptography and RSA:** Principles of Public-Key Cryptosystems - The RSA Algorithm -**Other Public-Key Cryptosystems:** Diffie-Hellman Key Exchange.

(12 Hours)

UNIT IV

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions - Two Simple Hash Functions - Requirements and Security - Hash Functions Based on Cipher Block Chaining - Secure Hash Algorithm (SHA) - SHA-3. **Message Authentication Codes:** Message Authentication Requirements - Message Authentication Functions - Security of MACs. **(12 Hours)**

UNIT V

Digital Signatures: Digital Signatures - Elgamal Digital Signature Scheme - Schnorr Digital Signature Scheme - NIST Digital Signature Algorithm - Elliptic Curve Digital Signature Algorithm. **Key Management and Distribution:** Symmetric Key Distribution Using Symmetric Encryption - Symmetric Key Distribution Using Asymmetric Encryption - Distribution of Public Keys - X.509 Certificates - Public-Key Infrastructure. **(12 Hours)**

BOOK FOR STUDY

1. **"Cryptography and Network Security Principles and Practice"**, William Stallings, Pearson Education, 7th Edition, 2017.

Unit I	:	Chapters: 1.1 - 1.5, 1.8, 2.1 - 2.3.
Unit II	:	Chapters: 3.1 - 3.5, 4.1 - 4.5.
Unit III	:	Chapters: 6.2 - 6.4, 7.1, 8.4, 8.5, 9.1, 9.2, 10.1
Unit IV	:	Chapters: 11.1 - 11.6, 12.1, 12.2, 12.4.
Unit V	:	Chapters: 13.1 - 13.5, 14.1 - 14.5.

BOOKS FOR REFERENCE

1. **"Cryptography and Network Security"**, Behrouz A Forouzan, Debdeep Mukhopadhyay, McGraw Hill Education, 3rd Edition, 2015.
2. **"Cryptography and Network Security",** Vunnava Dinesh Babu, D.J Chaudhari, Dr. Jagendra Singh, Dr. Himansu Sekhar Pattanayak, Good Writers Publishing, 2023.
3. **"Cryptography and Network Security"**, V.K. Jain, Khanna Book Publishing, 2016.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc23_cs03/preview
2. https://onlinecourses.nptel.ac.in/noc23_cs04/preview
3. https://www.udemy.com/course/du-cryptography/
4. https://www.udemy.com/course/the-mathematics-of-cryptography-with-dr-james-grime/
5. https://www.udemy.com/course/network-security-course/
6. https://www.udemy.com/course/complete-networking-fundamentals-course-ccna-start/

DESIGN AND ANALYSIS OF ALGORITHMS

Semester: II   **Hours: 4**

Code   : 23PCS2C05   **Credit: 4**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Recall the basic concepts of Algorithm, Algorithm efficiency, Divide and conquer, Dynamic Programming, Backtracking algorithms and Algorithm Limitation.	PSO - 1	K1
CO - 2	Understand the concepts of Algorithm, Algorithm efficiency, Divide and conquer, Dynamic Programming, Backtracking algorithms and Algorithm Limitation.	PSO - 4	K2
CO - 3	Use the basic concepts of Algorithm, Algorithm efficiency, Divide and conquer, Dynamic Programming, Backtracking algorithms and Algorithm Limitation.	PSO -3	K3
CO - 4	Analyze the basic concepts of Algorithm, Algorithm efficiency, Divide and conquer, Dynamic Programming, Backtracking algorithms and Algorithm Limitation.	PSO - 2	K4
CO - 5	Assess and Design the Algorithm, Algorithm efficiency, Divide and conquer, Dynamic Programming, Backtracking algorithms and Algorithm Limitation.	PSO -5	K5, K6

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

Semester: II							DESIGN AND ANALYSIS OF ALGORITHMS					Hours: 4
Code : 23PCS2C05												Credit: 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	5	3	3	2	3	3	5	2	3	3	3	3.18
CO - 2	3	3	5	3	5	3	3	3	3	5	3	3.55
CO - 3	3	5	3	4	3	3	3	4	5	3	3	3.55
CO - 4	3	2	3	5	3	4	3	5	2	3	4	3.36
CO - 5	3	3	3	3	3	5	3	3	3	3	5	3.36
Overall Mean Score												**3.40**

Result: The score for this course is **3.40** (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: Fundamentals of algorithmic problem solving - Important problem types. **Fundamentals of the analysis of algorithm efficiency**: Analysis frame work - Asymptotic Notations and Basic Efficiency Classes - Mathematical analysis of non-recursive Algorithms - Mathematical analysis of recursive algorithms.

(12 Hours)

UNIT II

Divide and conquer: Merge sort-Quick sort - Binary tree traversals and related properties- Multiplication of large integers - Strassen's matrix multiplication - Closest pair and Convex Hull Problems. **Greedy Technique**: Prim's algorithm - Kruskal's algorithm - Dijkstra's algorithm.   **(12 Hours)**

UNIT III

Dynamic Programming: Three Basic Examples -The Knapsak Problem and memory Funtions - Optimal Binary Search Trees - Warshall's and Floyd' Algorithm.

(12 Hours)

UNIT IV

Backtracking: N-Queens problem - Hamiltonian circuit problem - Subset sum problem - **Branch and bound:** - Assignment problem - Knapsack problem - Traveling salesman problem.   **(12 Hours)**

UNIT V

Limitation of algorithm power: P, NP and NP-complete problems- **Approximation algorithms for NP-hard problem:** Traveling salesman problem - Knapsack problem.   **(12 Hours)**

BOOK FOR STUDY

1. **"Introduction to the Design and Analysis of Algorithms",** Anany Levitin, Pearson Education 2011.

UNIT I	:	Chapters	: 1,2 (1.1-1.3, 2.1, 2.2, 2.3, 2.4)
UNIT II	:	Chapters	: 5 (5.1-5.5), 9 (9.1-9.3)
UNIT III	:	Chapter	: 8 (8.2, 8.4)
UNIT IV	:	Chapter	: 12 (12.1,12.2)
UNIT V	:	Chapters	: 11 (11.3), 12 (12.3)

BOOKS FOR REFERENCE

1. **"Introduction to algorithms",** Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, Prentice Hall 1990.

2. **"Design methods and Analysis of Algorithms",** S.K. Basu, Prentice Hall, 2005.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc23_cs96/preview

2. https://onlinecourses.swayam2.ac.in/cec22_cs13/preview

3. https://www.udemy.com/course/design-and-analysis-of-algorithms/

4. https://www.udemy.com/course/design-and-analysis-of-algorithm-/

5. https://www.coursera.org/specializations/boulder-data-structures-algorithms

INTERNET OF THINGS

Semester: II   **Hours: 4**

Code   : 23PCS2C06   **Credit: 4**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Relate architecture, access technologies, application protocols, prototyping embedded devices and online components in IoT and business models using IoT	PSO-1	K1
CO - 2	Understand the architecture, access technologies, application protocols, prototyping embedded devices and online components in IoT and business models	PSO-2	K2
CO - 3	Use architecture, access technologies, application protocols, prototyping embedded devices and online components in IoT and business models	PSO-4	K3
CO - 4	Evaluate the architecture, access technologies, application protocols, prototyping embedded devices and online components in IoT and business models	PSO-3	K4
CO - 5	Synthesis the architecture, access technologies, application protocols, prototyping embedded devices and online components in IoT and business models	PSO-5	K5, K6

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

Semester: II						INTERNET OF THINGS					Hours: 4
Code : 23PCS2C06											Credit: 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	5	4	2	3	2	3	5	3	4	2	3	3.27
CO - 2	3	4	3	5	3	2	3	5	4	3	2	3.36
CO - 3	3	3	5	3	5	3	3	3	3	5	3	3.55
CO - 4	2	5	3	3	3	3	2	3	5	3	3	3.18
CO - 5	2	3	3	3	3	5	2	3	3	3	5	3.18
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

IoT: Genesis of IoT - IoT and Digitization- IoT Impact- **IoT Network Architecture and Design :** Comparing IOT Architectures- The oneM2M IoT Standardized Architecture - The IOT World Forum (IOTWF) Standardized Architecture - Additional IOT Reference models -A Simplified IOT Architecture - The Core IoT Functional Stack - Fog Computing - Edge Computing - **Smart Objects:** The "**Things**" in IoT - Sensors, Actuators - Smart Objects.   **(12 Hours)**

UNIT II

IOT Access Technologies: Physical layer- MAC layers- Topology -Security - IEEE 802.15.4 Conclusions-IEEE 802.15.4g and 802.15.4e- IEEE 802.15.4g and 802.15.4e Conclusions-IEEE 1901.2a- IEEE 1901.2a Conclusions-IEEE 802.11ah- IEEE 802.11ah Conclusions - LoRaWAN. **IP as the IoT Network Layer:** Constrained Nodes - Constrained Networks- IP versions - Optimizing IP for IOT: From 6LoWPAN to 6Lo -RPL - **Application Protocols for IoT :** SCADA - IoT Application Layer Protocols: CoAP - MQTT.   **(12 Hours)**

UNIT III

Prototyping Embedded Devices: Electronics - Embedded Computing Basics - Arduino - Raspberry Pi - Beagle Bone Black - Electric Imp. **Prototyping the Physical Design:** Non digital Methods - Laser Cutting - 3D printing - CNC Milling - Repurposing/Recycling.   **(12 Hours)**

UNIT IV

Prototyping Online Components: Getting started with an API - Writing a New API - Real-Time Reactions - Other Protocols. **Techniques for Writing Embedded Code:** Memory Management - Performance and Battery Life - Libraries - Debugging.   **(12 Hours)**

UNIT V

Business Models: A Short History of Business Models - Models -Funding an Internet of Things Startup - Lean Startups. **Moving to Manufacture:** Designing Kits - Designing Printed circuit boards - Certification - Costs - Scaling Up Software. **Ethics:** Privacy - Control - Environment - Solutions.   **(12 Hours)**

BOOKS FOR STUDY

1. **"IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things",** David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017.

    UNIT I   :   Chapters :1, 2, 3

    UNIT II   :   Chapters :4, 5, 6

2. **"Designing the Internet of Things",** Adrian McEwen and Hakim Cassimally, Wiley, 2014.

UNIT III	:	Chapters : 5,6
UNIT IV	:	Chapter : 7
UNIT V	:	Chapters : 9, 10, 11

BOOKS FOR REFERENCE

1. **"Internet of Things - From Research and Innovation to Market Deployement"** **,** Ovidiu Vermesan and Peter Friess, River Publishers, 2014.
2. **"Learning Internet of Things",** Peter Waher, Packt Publishing, 2015.
3. **"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black"**, Donald Norris, McGraw Hill, 2015.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc23_cs83/preview
2. https://www.udemy.com/course/internet-of-things-the-mega-course/
3. https://www.udemy.com/course/the-complete-internet-of-things-course-for-beginners/
4. https://www.coursera.org/specializations/iot
5. https://www.coursera.org/search?query=Internet%20of%20things

DESIGN AND ANALYSIS OF ALGORITHMS - LAB

Semester: II   **Hours: 3**

Code   : 23PCS2P03   **Credit: 2**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Acquire the knowledge for Data structures and their Algorithms	PSO - 4	K1
CO - 2	Understand computing Methodology to find the algorithm efficiency.	PSO - 2	K2
CO - 3	Develop a Dynamic Programming algorithm to meet desired needs.	PSO - 1	K3
CO - 4	Analyze a problem and identify the computing requirements appropriate for its solution	PSO - 3	K4
CO - 5	Evaluate the algorithmic principles and efficiency of Knapsack problem and Dynamic Programming.	PSO - 5	K5, K6

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

Semester: II							DESIGN AND ANALYSIS OF ALGORITHMS - LAB					Hours: 3
Code : 23PCS2P03												Credit: 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	2	5	4	5	3	3	4	2	5	3	3.55
CO - 2	4	3	2	5	2	2	4	5	3	2	2	3.09
CO - 3	5	3	3	4	3	3	5	4	3	3	3	3.55
CO - 4	4	5	3	3	3	2	4	3	5	3	2	3.36
CO - 5	3	3	4	4	4	5	3	4	3	4	5	3.82
Overall Mean Score												3.47

Result: The score for this course is **3.47** (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= $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Implement the following problems using Python Programming

1. Compute the transitive closure of any directed graph using Warshall's Algorithm.

2. Knapsack problem using backtracking

3. 0/1 knapsack problem using Dynamic programming

4. Apply the divide and conquer technique implement Strassen's matrix Multiplication Algorithm

5. Find minimum cost spanning Tree of a given undirected graph using Kruskal's Algorithm.

6. Find minimum cost spanning Tree of a given undirected graph using Prim's Algorithm.

7. All-pairs Shortest Paths algorithms

8. 8 Queen's problem using backtracking

INTERNET OF THINGS - LAB

Semester: II   **Hours: 3**

Code   : 23PCS2P04   **Credit: 1**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Acquire the basic knowledge for IoT Sensors and Applications	PSO - 1	K1
CO - 2	Implement web server program for local hosting in IoT	PSO - 2	K2
CO - 3	Develop IoT programs for object detection	PSO - 3	K3
CO - 4	Analyze IoT Sensors and IoT applications	PSO - 4	K4
CO - 5	Design and Create IoT application for health monitoring, agriculture, and other areas	PSO - 5	K5, K6

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

Semester: II											Hours: 3
Code : 23PCS2P04	INTERNET OF THINGS - LAB										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	4	3	3	3	3	5	3	4	3	3	3.55
CO - 2	4	3	3	5	3	3	4	5	3	3	3	3.55
CO - 3	3	5	3	3	3	2	3	3	5	3	2	3.18
CO - 4	4	3	5	3	5	3	4	3	3	5	3	3.73
CO - 5	3	3	3	3	3	5	3	3	3	3	5	3.36
Overall Mean Score												3.47

Result: The score for this course is **3.47** (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. IoT program to turn ON/OFF LED light (3.3V)

2. IoT program using IR sensor (Smart Garbage Monitoring, Detecting Parking Availability, etc.)

3. IoT program using Humidity and Temperature Monitoring (Forest fire Detection, Weather Monitoring)

4. IoT web server program for local hosting

5. IoT program using Soil Moisture Sensor

6. IoT program using Ultrasonic Sensor (Distance Measurement, etc.)

7. Real-time IoT program using Relay Module (Smart Home Automation with 230V)

8. IoT program for Fire Detection (Home, Industry,etc.)

9. IoT program for Gas Leakage detection (Home, Industry, etc.)

10. IoMT program using Heartbeat Sensor

DATA ANALYTICS USING R

Semester: II   **Hours: 6**

Code   : 23PCS2ID1   **Credit: 3**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Acquire the Basics of R, Advanced data structure, Functions, Control Statement, Basics Statistics, Linear and Non-Linear Model in R Language.	PSO-1	K1
CO-2	Explore R, Advanced data structure, Functions, Control Statement, Basics Statistics, Linear and Non-Linear Model in R Language	PSO-4	K2
CO-3	Apply R in Advanced data structure, Functions, Control Statement, Basics Statistics, Linear and Non-Linear Model in R Language.	PSO-3	K3
CO-4	Illustrate R, Advanced data structure, Functions, Control Statement, Basics Statistics, Linear and Non-Linear Model in R Language	PSO-2	K4
CO-5	Evaluate R, Advanced data structure, Functions, Control Statement, Basics Statistics, Linear and Non-Linear Model in R Language	PSO-5	K5, K6

RELATIONSHIP MATRIX FOR COURSE OUTCOMES, PROGRAMME OUTCOMES PROGRAMME SPECIFIC OUTCOMES

Semester: I							DATA ANALYTICS USING R					Hours: 6
Code : 23PCS2ID1												Credit: 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	5	3	2	3	2	2	5	3	3	2	2	2.91
CO-2	3	3	5	3	5	3	3	3	3	5	3	3.55
CO-3	4	5	3	3	3	3	4	3	5	3	3	3.55
CO-4	3	4	3	5	3	4	3	5	4	3	4	3.73
CO-5	4	3	3	4	3	5	4	4	3	3	5	3.73
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

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.   **(18 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   **(18 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.   **(18 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.   **(18 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.   **(18 Hours)**

BOOK FOR STUDY

1. **"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. **"Data Analytics With R Programming",** V. Bhuvaneswari, Scitech Publications (India) Pvt Ltd, 2018

2. **"Data Analytics Using R",** Seema Acharya, McGraw Hill Education, First Edition 2018.

3. **"R Programming An Approach to Data Analytics"**, G Sudhamathy, C Jothi Venkateswaran, MJP Publishers, 2021.

4. **"Big Data Analytics Made Easy",** Y. Lakshmi Prasad, Notion Press, 2016

WEB RESOURESES

6. https://www.coursera.org/learn/data-analysis-r

7. https://www.coursera.org/specializations/statistics

8. https://www.coursera.org/specializations/data-science-foundations-r?

9. https://www.udemy.com/course/r-level1/

10. https://www.udemy.com/course/r-programming/

BIG DATA ANALYTICS

Semester: II   **Hours: 4**

Code   : 23PCS2SE2   **Credit: 2**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Acquire the knowledge of types of data, technology landscape of big data, Hadoop, Mango DB, Hive and Pig in Big Data Analytics	PSO-1	K1
CO - 2	Understand the types of data, technology landscape of big data, Hadoop, Mango DB, Hive and Pig in Big Data Analytics	PSO-2	K2
CO - 3	Develop the knowledge in types of data, technology landscape of big data, Hadoop, Mango DB, Hive and Pig in Big Data Analytics	PSO- 5	K3
CO - 4	Examine the types of data, technology landscape of big data, Hadoop, Mango DB, Hive and Pig in Big Data Analytics	PSO- 4	K4
CO - 5	Assess the types of data, technology landscape of big data, Hadoop, Mango DB, Hive and Pig in Big Data Analytics	PSO-3	K5, K6

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

Semester: II							BIG DATA ANALYTICS					Hours:4
Code : 23PCS2SE2												Credit: 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	5	3	2	3	2	3	5	3	3	2	3	3.09
CO - 2	4	4	3	5	3	3	4	5	4	3	3	3.73
CO - 3	3	3	4	3	4	5	3	3	3	4	5	3.64
CO - 4	3	3	5	4	5	3	3	4	3	5	3	3.73
CO - 5	3	5	2	3	2	3	3	3	5	2	3	3.09
Overall Mean Score												3.46

Result: The score for this course is **3.46** (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	Mean Overall Score for COs= Total of Mean Scores
Total No. of POs & PSOs	Total No. of Cos

UNIT I

Types of Digital Data: Classification of Digital Data: Structured Data- Semi Structured Data - Unstructured Data. **Introduction to Big Data**: Characteristics of Data - Evolution of Big data - Definition of Big data - Challenges with Big Data - Other Characteristics of Data which are not Definitional Traits of Big Data- why Big Data? - Traditional Business Intelligence (BI) versus Big Data - A Typical Data Warehouse Environment - A Typical Hadoop Environment. **Big Data Analytics:** Classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data-Top Challenges Facing Big Data- why is Big Data Analytics important? - Data Science - Data Scientist - Terminologies used in Big Data Environments - Basically Available Soft State Eventual Consistency (BASE) - Few Top Analytics Tools.

(12 Hours)

UNIT II

The Big Data Technology Landscape: NoSQL, Comparison of SQL, NoSQL and NewSQL -Hadoop. **Introduction to Hadoop:** RDBMS Versus Hadoop - Distributed Computing Challenges - Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem. **(12 Hours)**

UNIT III

Introduction to MongoDB: what is MongoDB - why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types in MangoDB - MongoDB Query Language.

Introduction to MAPREDUCE Programming: Mapper - Reducer - Combiner - Partitioner - Searching - Sorting - Compression. **(12 Hours)**

UNIT IV

Introduction to Hive: What is Hive -Hive Architecture -Hive Data Types - Hive File Format - Hive Query Language (HQL) - Partitions - Bucketing - Views - Sub- Query - Joins - Aggregations - Group by and Having - RCFile Implementation - User Defined Function. **(12 Hours)**

UNIT V

Introduction to Pig: what is Pig - The Anatomy of Pig - Pig on Hadoop -Pig Philosophy - Use Case for Pig - Pig Latin Overview - Data Types in Pig - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions(UDF) - Parameter Substitution - Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive. **(12 Hours)**

BOOK FOR STUDY

1. **"Big Data and Analytics",** Seema Acharya, Subhashini Chellappan, Wiley Publications, First Edition, 2015

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

BOOKS FOR REFERENCE

2. **"Big data for dummies",** Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman, John Wiley & Sons, Inc., 2013.

3. **"Hadoop The Definitive Guide",** Tom White, O'Reilly Publications, Fourth Edition, 2015.

4. **"Hadoop For Dummies",** Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss, Wiley Publications, 2014.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc23_cs112/preview
2. https://www.udemy.com/course/the-data-science-course-complete-data-science-bootcamp/
3. https://www.udemy.com/course/python-big-data-analytics-and-data-science/
4. https://www.coursera.org/learn/big-data-analysis-deep-dive

CYBER SECURITY

Semester: II   **Hours: 2**

Code   : 23PAE2SK2   **Credit: 2**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	State the need of Cyber Security and history of Internet	PSO-1	K1
CO-2	Understand history and types of Cyber Crime	PSO-2	K2
CO-3	Apply critical thinking in Security Policies and Cyber Laws	PSO-3	K3
CO-4	Discuss and demonstrate the cyber security components and infrastructure security	PSO-4	K4
CO-5	Diagnose the ways and means of fighting Cyber Attacks	PSO-5	K5, K6

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

Semester: II											Hours: 2
Code : 23PAE2SK2			CYBER SECURITY								Credit: 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	5	3	3	3	3	3	5	3	3	3	3	3.36
CO-2	4	3	3	5	3	3	4	5	3	3	3	3.55
CO-3	3	5	3	4	3	3	3	4	5	3	3	3.55
CO-4	3	3	5	4	5	3	3	4	3	5	3	3.73
CO-5	2	3	3	2	3	5	2	2	3	3	5	3.00
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: Cyber Security – The need of the Hour - History of Internet – Impact of Internet – Internet in India **(6 Hours)**

UNIT II

Introduction to Cyber Security: Cyber Security – CIA Triad - Reasons for Cyber Crimes – Why we need Cyber Security – Damage to the Organizations – History of Cyber Crimes – Types of Cyber Crimes **(6 Hours)**

UNIT III

Cyber Security Components: OSI Layer – Zero Day Attacks – Types of Network Attacks – Application Security – Endpoint Security – Identify and Access Management (IAM) – Mobile Security – Data Security - Drive-By Download - Infrastructure Security - Disaster Recovery (DR) - End-user Education **(6 Hours)**

UNIT IV

Fighting Cyber Attacks: Defense in Depth – Authentication - Cryptography – Firewall - Data Loss Prevention - Antivirus Software - Virtual Private Network (VPN)- Web browsers - Data Backup – Conclusion **(6 Hours)**

UNIT V

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 - 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 **(6 Hours)**

BOOKS FOR STUDY

1. **"Introduction to Cyber Security: Guide to the World of Cyber Security",** Anand Shinde, Notion Press, 2021

   Unit I   :   Chapter: 1
   Unit II :   Chapter: 2.
   Unit III :   Chapter: 3
   Unit IV :   Chapter: 4.

2. "Introduction to information security and cyber laws", Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla, KLSI, Dreamtech Press, 2014

   Unit V :   Chapter: 4

BOOKS FOR REFERENCE

1. **"Information and Cyber security: Principles and Practices",** S U, Aswathy; Faizal, Ajesh; V, Antony Asir Daniel, Noor Publishing, 2020

2. "**Security in the Digital Age: Social Media Security Threats and Vulnerabilities**", Henry A. Oliver, Create Space Independent Publishing Platform, 2015

3. "**Cybersecurity for Beginners**", Raef Meeuwisse, Second Edition, 2017

4. "**Auditing IT Infrastructures for Compliance**", Martin Weiss, Michael G. Solomon, 2nd Edition, Jones Bartlett Learning, 2017

WEB RESOURCES

1. https://www.coursera.org/professional-certificates/google-cybersecurity

2. https://www.coursera.org/learn/cybersecurity-for-everyone

3. https://www.coursera.org/specializations/intro-cyber-security

4. https://www.udemy.com/course/cybersecurity-from-beginner-to-expert/

5. https://www.udemy.com/course/it-law-cyber-crimes-and-data-protection-laws/

JACEP - EXTENSION

P.G. PROGRAMME OUTCOMES (2023 - 2026)

PO. NO.	UPON COMPLETION OF THIS PROGRAMME THE STUDENTS WILL BE ABLE TO
1.	Acquire comprehensive knowledge and evaluate analytically in their specific disciplines.
2.	Apply the acquired knowledge in professional and social life.
3.	Evolve new methodologies in the specific discipline leading to innovation and employability.
4.	Develop critical thinking required to pursue research.
5.	Apply the computational and life skills to the challenging problems in life.
6.	Design and develop independent projects.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO. NO.	UPON COMPLETION OF THIS PROGRAMME THE STUDENTS WILL BE ABLE TO	PO MAPPED
PSO - 1	Understand and identify the needs of the community and will be enabled to articulate viewpoints both practically and theoretically.	PO1, PO3
PSO - 2	Develop among themselves a sense of social and civic responsibility and will be enabled to be more culturally equipped.	PO2, PO3, PO4, PO6
PSO - 3	Apply their education to finding practical solutions to individual, community problems and will be enabled to exercise their rights properly.	PO1, PO3, PO4, PO6
PSO - 4	Acquire leadership qualities and a democratic attitude by carrying out their duties as effective citizens of the country.	PO2, PO3, PO5
PSO - 5	Develop the capacity to think clearly and cogently to meet emergencies and national disasters and practice national integration and social harmony	PO3, PO4, PO5

JACEP - EXTENSION

Semester: II   **Hours: 30**

Code   : 23PSL2EX1   **Credit: 1**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Impart knowledge of the importance of education	PSO- 3, PSO-2	K1
CO - 2	Analyse the reasons for health problems and impart knowledge on a balanced diet.	PSO-1, PSO-5	K2
CO - 3	Develop a concern for the voiceless and faceless	PSO-1, PSO-2, PSO-5	K3
CO - 4	Get awareness of environmental issues	PSO-1, PSO-3	K4
CO - 5	Apply Knowledge to the society	PSO-3, PSO-4, PSO-5	K5, K6

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

Semester: II											Hours: 30
Code : 23PSL2EX1			**JACEP - EXTENSION**								**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	3	3	4	4	3	3	3	5	3	3	5	3.54
CO - 2	3	4	3	2	4	3	4	5	4	5	2	3.55
CO - 3	3	4	5	3	3	4	3	3	5	3	5	3.72
CO - 4	2	2	3	3	2	3	3	5	5	5	3	3.27
CO - 5	3	3	5	3	3	4	5	5	3	3	5	3.82
Overall Mean Score												**3.58**

Result: The score for this course is **3.58** (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: LITERACY GROUP:

Giving orientation to the students about JACEP - focusing on School dropouts and counseling the parents to re-admit the school dropouts - conducting awareness programs through kindling culturals - organizing games based on the disciplines - conducting competitions for school children – educating the school children about the positives and negatives of social media.

UNIT II: HEALTH AND HYGIENE GROUP:

Doing a survey on health problems - organizing medical camps and talks - organizing general check-ups by B.voc students of JAC to the adopted villages.

UNIT III: LIAISON GROUP AND PEOPLE ORGANIZATION GROUP:

Motivating NREGA workers to access government savings schemes - celebrating important days - organizing income generation skill training for self-help groups. organizing population education programmes - conducting awareness programmes on emerging social issues - fostering tie-ups with non-governmental organizations and local bodies to ensure the development of the villages - organizing youth, farmers and self-help group to function democratically.

UNIT IV: ENVIRONMENTAL GROUP:

Tree and sapling plantation - promotion of Herbal Gardens - organizing personal hygiene awareness talk – observing environmental-related days –awareness campaign to educate the villagers to protect the environment.

UNIT V: APPLICATION OF KNOWLEDGE:

Conducting Special Skill Training for self-employment based on discipline to the target group with the help of JAC SARWODEEP and government organizations – serving as intermediaries between unorganized sector workers and government welfare schemes.

SCHEME OF EVALUATION

Continuous Internal Assessment		
1.	Attendance (30 hours)	10 Marks
2.	Field Visit & Report	50 marks
3.	Assignment	40 Marks
Total		**100 marks**

ADVANCED JAVA PROGRAMMING

Semester: III   **Hours: 4**

Code   : 23PCS3C07   **Credit: 4**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Remember the Java Tools, AWT and Swing, RMI, Applets, Security and JDBC concepts	PSO-1	K1
CO-2	Understand the Java Tools, AWT and Swing, RMI, Applets, Security and JDBC	PSO-2	K2
CO-3	Apply the Java Tools, AWT and Swing, RMI, Applets, Security and JDBC	PSO-4	K3
CO-4	Analyze the Java Tools, AWT and Swing, RMI, Applets, Security and JDBC	PSO-3	K4
CO-5	Evaluate & Create the Java Tools, AWT and Swing, RMI, Applets, Security and JDBC	PSO-5	K5, K6

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

Semester: III											Hours: 4
Code : 23PCS3C07	ADVANCED JAVA PROGRAMMING										Credit: 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	5	4	2	3	2	3	5	3	4	2	3	3.27
CO - 2	4	3	3	5	3	2	4	5	3	3	2	3.36
CO - 3	3	4	5	3	5	3	3	3	4	5	3	3.73
CO - 4	2	5	4	3	4	3	2	3	5	4	3	3.45
CO - 5	4	3	2	3	2	5	4	3	3	2	5	3.27
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

UNIT I

INSIDE JAVA: Java Tools: Introduction- Javadoc -Javap -JCMD - JDB - Jar. **Exception Handling:** Exceptions -Handling Exceptions - An Example - Types of Exceptions - Catching Exception. **Multi-threading:** Introduction - Main Thread Using Sleep - Creating Thread - Interrupting Thread - Suspending and Resuming - Thread Priority - Using join() - Synchronization. **Garbage Collection:** Introduction - Exploring JVM- JVM Options -Garbage Collection. **(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 Streams - Reading/writing Arrays via Streams -Pipes- 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 -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: ClientSide Java - Life Cycle -Writing an Applet - Generating Class File - Running the Applet - Security - Utility Methods - Using Status Bar - Applet Context 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 -Using XmlRpcServlet**. Java and Soap:** Introduction - Differences with XML-RPC - Soap Architecture - SOAP Flavors - SOAP Messages - SOAP Binding - RPC Using SOAP - Web Service. **(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. **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 - Getting Database Information.   **(12 Hours)**

COURSE BOOK

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

    UNIT I   :   Chapters : 1.1 - 1.4, 1.6, 1.7, 2.1-2.5, 3.1 - 3.9, 4.1 - 4.4.

    UNIT II :   Chapters : 9, 10.1 - 10.9, 11.

    UNIT III :   Chapters : 12.1 - 12.4, 13.1 - 13.7, 14.1 - 14.8

    UNIT IV :   Chapters : 16, 17.1 - 17.5, 17.10, 18.1 - 18.8

    UNIT V   :   Chapters : 19.1 - 19.2, 20.1 - 20.3, 20.5 - 20.9, 21.1 - 21.10,

                                       22.1 - 22.9, 22.11.

BOOKS FOR REFERENCE

1. Herbert Scheldt **"The Complete Reference Java",** McGraw Hill Publishing Company Limited, Eleventh Edition, 2018.

2. Cays Horstmann and Gary Cornell **"Core Java Volume II",** - Eleventh Edition, Pearson Education, 2019.

3. Dr. R. Nageswara Rao, **"Core and Advanced Java Black Book",** Dreamtech Press, First Edition, 2018.

WEB RESOURCES

1. https://www.udemy.com/course/advanced-java-programming/

2. https://www.udemy.com/course/java-se-programming/

3. https://www.udemy.com/course/java-se-programming/

4. https://onlinecourses.swayam2.ac.in/aic20_sp13/preview

5. https://onlinecourses.nptel.ac.in/noc24_cs43/preview

ADVANCED MACHINE LEARNING TECHNOLOGIES

Semester: III   **Hours: 4**

Code   : 23PCS3C08   **Credit: 4**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE, THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Remember Machine Learning, Classification, Cluster and Deep Learning Techniques	PSO-1	K1
CO-2	Understand Machine Learning, Classification, Cluster and Deep Learning Techniques	PSO-2	K2
CO-3	Apply Machine Learning, Classification, Cluster and Deep Learning Techniques	PSO-3	K3
CO-4	Analyze Machine Learning, Classification, Cluster and Deep Learning Techniques	PSO-5	K4
CO-5	Evaluate and Create Machine Learning, Classification, Cluster and Deep Learning Techniques	PSO-4	K5, K6

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

Semester: III											Hours: 4
Code : 23PCS3C08				**ADVANCED MACHINE LEARNING TECHNOLOGIES**							**Credit: 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	5	3	4	3	4	2	5	3	3	4	2	3.45
CO - 2	3	2	3	5	3	4	3	5	2	3	4	3.36
CO - 3	2	5	3	4	3	2	2	4	5	3	2	3.18
CO - 4	4	2	4	3	4	5	4	3	2	4	5	3.64
CO - 5	2	3	5	3	5	4	2	3	3	5	4	3.55
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 = <u>Total of Values</u> Total No. of POs & PSOs	Mean Overall Score for COs= <u>Total of Mean Scores</u> Total No. of COs

UNIT I

Introducing Machine Learning: The Origins of Machine Learning, Uses and abuses of Machine Learning - How machines learn - Machine learning in practice - Machine learning with R - **Managing and Understanding Data:** R Data Structures - Managing Data with R - Exploring and Understanding Data - **Lazy Learning - Classification Using Nearest Neighbors:** Understanding the Nearest Neighbor Classification - The k-NN Algorithm- Diagnosing Breast Cancer with the k-NN Algorithm **(12 Hours)**

UNIT II

Probabilistic Learning - Classification Using Naive Bayes: Understanding Naïve bayes - Example: filtering Mobile Phone Spam with the Naive Bayes Algorithm - **Divide and Conquer - Classification Using Decision Trees and Rules:** Understanding Decision Trees - Example: Identifying Risky Bank Loans using C5.0 Decision Trees- Understanding Classification Rules- Example: Identifying Poisonous Mushrooms with Rule Learners. **(12 Hours)**

UNIT III

Forecasting Numeric Data - Regression Methods: Understanding Regression- Example - Predicting auto insurance claims costs using Linear Regression- Understanding Regression Trees and Model Trees- Example: Estimating the Quality of Wines with Regression Trees and Model Trees - **Black Box Methods - Neural Networks and Support Vector Machines:** Understanding Neural Networks - Example: Modelling the Strength of Concrete with ANNs - Understanding Support vector Machines- Example: Performing OCR with SVMs- **Finding Patterns - Market Basket Analysis Using Association Rules:** Understanding association rules- Example: Identifying frequently Purchased groceries with association rules.

(12 Hours)

UNIT IV

Finding Groups of Data - Clustering with K-Means: Understanding Clustering- - Finding teen market segments using k-means Clustering - **Building Better Learners:** Tuning Stock Models for Better Performance - Improving model performance with ensembles - Stacking models for meta-Learning. **(12 Hours)**

UNIT V

Introduction to Deep Learning: Deep Learning Model- **Convolutional Neural Networks (CNNs):** Structure and Properties of CNNs - Components of CNN Architectures - Tuning Parameters - Notable CNN Architectures - Regularization. **Recurrent Neural Networks (RNNs):** Fully Recurrent Networks - Training RNNs with Back-Propagation Through Time (BPPT)- Elman Neural Networks - Neural History Compressor - Long Short-Term Memory (LSTM) - Traditional LSTM - Training LSTMs - Structural Damping Within RNNs - Tuning Parameter Update Algorithm - Practical Example of RNN: Pattern Detection. **(12 Hours)**

COURSE BOOKS

1. Brett Lantz**, "Machine Learning with R"**, Fourth Edition, Addison-Wesley Packt Publishing, 2013.

   UNIT I   : Chapters: 1 - 3   **UNIT II**   : Chapters: 4 - 5
   UNIT III : Chapters: 6 - 8   **UNIT IV**   : Chapters: 9 ,14

2. Taweh Beysolow, **"Introduction to Deep Learning Using R"**, Apress Publications, San Francisco, California, USA, 2017.

   UNIT V   : Chapters: 1, 5-6

BOOKS FOR REFERENCE

1. Bertt Lantz**, "Machine Learning with R: Expert techniques for predictive modeling",** 3rd Edition, April 15,2019

2. Jason Bell, **"Machine Learning: Hands-On for Developers and Technical Professionals",** Wiley Publication,2015.

3. S Sridhar, M Vijayalakshmi, **"Machine Learning"** Oxford University Press, 2021

WEB RESOURCES

1. https://www.udemy.com/course/machine-learning-for-absolute-beginners-level-1/
2. https://onlinecourses.nptel.ac.in/noc23_cs98/preview
3. https://onlinecourses.nptel.ac.in/noc23_ee87/preview
4. https://www.udemy.com/course/machinelearning/
5. https://www.udemy.com/course/deeplearning_x/

WEB TECHNOLOGIES

Semester: III   **Hours: 4**

Code   : 23PCS3C09   **Credit: 4**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Remember the concepts of XHTML and CSS, JavaScript, Xml, PHP,AngularJS and jQuery	PSO - 1	K1
CO-2	Understand XHTML and CSS, JavaScript, Xml, PHP, AngularJS and jQuery	PSO - 2	K2
CO-3	Apply XHTML and CSS, JavaScript, Xml, PHP, AngularJS and jQuery	PSO - 4	K3
CO-4	Analyse XHTML and CSS, JavaScript, Xml, PHP, AngularJS and jQuery	PSO - 5	K4
CO-5	Evaluate and Create applications using XHTML and CSS, JavaScript, Xml, PHP, AngularJS and jQuery	PSO - 3	K5, K6

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

Semester: III							WEB TECHNOLOGIES					Hours: 4
Code : 23PCS3C09												Credit: 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	5	4	2	3	2	3	5	3	4	2	3	3.27
CO - 2	2	3	4	5	4	3	2	5	3	4	3	3.45
CO - 3	4	2	5	3	5	3	4	3	2	5	3	3.55
CO - 4	2	3	4	3	4	5	2	3	3	4	5	3.45
CO - 5	3	5	3	4	3	2	3	4	5	3	2	3.36
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 = $\dfrac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	Mean Overall Score for COs= $\dfrac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

UNIT I

Introduction to XHTML/XHTML: Basic Syntax - Standard HTML Document Structure - Basic Text Markup - Images - Hypertext Links - Lists- Tables- Forms - **Cascading Style Sheets:** Introduction - Levels of Style Sheets - Style Specification Formats - Selector Forms - Property -Value Forms - Font Properties - List Properties Alignment ofText - Color - The Box Model - Background Images - The<span> and <div>Tags - Conflict Resolution. **(12 Hours)**

UNIT II

The Basics Of JavaScript: Overview of JavaScript - Object Orientation and JavaScript - General Syntactic Characteristics - Primitives, Operations, and Expressions - Screen Output and Keyboard Input - Control Statements - Object Creation and Modification - Arrays - Functions - Constructors - Pattern Matching Using Regular Expressions - Another Example - Errors in Scripts - **JavaScript And HTML Documents:** The JavaScript Execution Environment - The Document Object Model - Elements Access in Java Script - Events and Event Handling - Handling Events from Body Elements - Handling Events from Text Box and Password Elements - The DOM2 Event Model. **(12 Hours)**

UNIT III

Dynamic Documents with JavaScript: Introduction - Positioning Elements - Moving Elements - Element Visibility - Changing Color and Fonts - Dynamic Content - Stacking Elements - Locating the Mouse Cursor - Reacting to a Mouse Click - Slow Movement of Elements - Dragging and Dropping Elements. **Introduction to XML**: Syntax of XML - XML Document Structure - Document type definitions - Namespaces - XML Schemas - Displaying Raw XML Documents - Displaying XML Documents with CSS - XSLT Style Sheets - Web Services.

(12 Hours)

UNIT IV

PHP Introduction to PHP: Overview of PHP - General Syntactic Characteristics - Primitives, Operations, and Expressions - Output - Control Statements - Arrays - Functions - Pattern Matching - Form Handling - Cookies - Session Tracking.

(12 Hours)

UNIT V

Getting Started with AngularJS: Why AngularJS - Understanding AngularJS - Modules - Scope and the Data Model - Views with Templates and Directives - Expressions - Controllers - Data Binding - Service - Dependency Injection - Compiler - An Overview of the AngularJS Life Cycle - Integrating AngularJS with Existing JavaScript and jQuery - Adding AngularJS in an HTML Document - Using the Global APIs - Creating a Basic AngularJS Application - Using jQuery Lite in AngularJS Applications. **(12 Hours)**

COURSE BOOKS

1. Robert W. Sebesta, **"Programming the World Wide Web",** Eighth Edition, Pearson Education, 2015

UNIT I:	Chapters: 2.2-2.9, 3.
UNIT II:	Chapters: 4, 5.1 - 5.8.
UNIT III:	Chapters: 6, 8.3-8.11.
UNIT IV:	Chapter: 7.2-7.12.

2. Brad Dayley, **"Learning AngularJS",** Pearson Education. Inc, USA Edition, 2015.

UNIT V:	Chapter: 2.1-2.3, 2.5, 2.6, 2.9, 2.10

BOOKS FOR REFERENCE

1. Jeffrey C. Jackson, **"Web Technologies-A Computer Science Perspective",** Pearson Education, 7th Impression, 2012.
2. Chris Bates, **"Web Technology Theory and Practice",** Pearson Education, 2012.

WEB RESOURCES

1. https://www.udemy.com/course/the-web-developer-bootcamp/
2. https://www.udemy.com/course/web-developer-course/
3. https://www.udemy.com/course/the-complete-web-developer-zero-to-mastery/
4. https://www.udemy.com/course/web-application-penetration-testing-v31-bug-hunting/
5. https://www.udemy.com/course/design-and-develop-a-killer-website-with-html5-and-css3/

ADVANCED JAVA PROGRAMMING-LAB

Semester: III   **Hours: 3**

Code   : 23PCS3P05   **Credit: 2**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Recall the programs in Java using AWT, Swing components, Applets and JSP	PSO-1	K1
CO - 2	Understand the remote methods in an application using RMI Method.	PSO-2	K2
CO - 3	Explore and apply event handling on AWT and Swing, Applets and JSP components.	PSO-4	K3
CO - 4	Demonstrate the Internet Programming using Java Applets and JSP	PSO-3	K4
CO - 5	Develop the dynamic web pages using AWT, Swing and JSP.	PSO-5	K5, K6

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

Semester: III											Hours: 3
Code : 23PCS3P05	ADVANCED JAVA PROGRAMMING-LAB										Credit: 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	5	2	3	2	3	4	5	2	2	3	4	3.18
CO - 2	3	3	3	5	3	2	3	5	3	3	2	3.18
CO - 3	3	4	5	3	5	3	3	3	4	5	3	3.73
CO - 4	2	5	4	3	4	3	2	3	5	4	3	3.45
CO - 5	4	3	2	3	2	5	4	3	3	2	5	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 = <u>   Total of Values   </u>
                    Total No. of POs & PSOs
	Mean Overall Score for COs= <u>Total of Mean Scores</u>
	                              Total No. of COs

LIST OF PRACTICALS

1. Simple programs using Classes and Objects.

2. Perform different types of Inheritance.

3. Programs using Exception handling.

4. Program for multi-threading concepts.

5. Programs for creating packages.

6. Implementing various event handling mechanisms using AWT.

7. Programs using Swings.

8. Illustrate the Client/Server applications using RMI.

9. Scientific calculator using applet.

10. Implement basic scripting elements of JSP.

11. Program for basic servlets.

12. Implement the SQL commands using JDBC.

WEB RESOURCES

1. https://www.udemy.com/course/advanced-java-programming/

2. https://www.udemy.com/course/java-se-programming/

3. https://www.udemy.com/course/java-se-programming/

4. https://onlinecourses.swayam2.ac.in/aic20_sp13/preview

5. https://onlinecourses.nptel.ac.in/noc24_cs43/preview

MACHINE LEARNING TECHNOLOGIES - LAB

Semester: III   **Hours: 3**

Code   : 23PCS3P06   **Credit: 1**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE, THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Recognize the mathematical and statistical prospective of machine learning algorithms through python programming	PSO - 1	K1
CO - 2	Understand machine learning models through python in built functions	PSO - 3	K2
CO - 3	Impart and develop the machine learning models for real-time dataset	PSO - 2	K3
CO - 4	Demonstrate the deep learning models for real-time applications	PSO -4	K4
CO - 5	Evaluate the performance machine learning models for real-time dataset	PSO -5	K5 - K6

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

Semester: III							MACHINE LEARNING TECHNOLOGIES - LAB					Hours: 3
Code : 23PCS3P06												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	3	3	4	3	2	5	4	3	3	2	3.36
CO - 2	3	5	2	4	2	3	3	4	5	2	3	3.27
CO - 3	3	3	4	5	4	3	3	5	3	4	3	3.64
CO - 4	2	3	5	3	5	4	2	3	3	5	4	3.55
CO - 5	3	3	2	3	2	5	3	3	3	2	5	3.09
Overall Mean Score												3.38

Result: The score for this course is **3.38** (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

LIST OF PRACTICALS

1. Compute the Central Tendency Measures: Mean, Median, Mode, Measure of Dispersion: Variance, Standard Deviation

2. Implement Linear and Multiple Linear Regressions

3. Implementation of Logistic Regression using sklearn

4. Implement binary classification model.

5. Classification with Nearest Neighbours and NavieBaye Algorithms

6. Implement Decision tree for classification using sklearn and parameter tuning

7. Implement the k-means algorithm.

8. Implement an Image Classifier using CNN.

9. Implement an Auto encoder.

10. Implement a Simple LSTM.

WEB RESOURECES

1. https://www.udemy.com/course/python-for-machine-learning-data-science-masterclass/

2. https://www.udemy.com/course/machine-learning-course-with-python/

3. https://www.udemy.com/course/data-science-deep-learning-in-python/

4. https://www.udemy.com/course/deep-learning-with-python-and-keras/

SOFT COMPUTING

Semester: III   **Hours: 4+2**
Code   : 23PCS3E2A   **Credit: 4**
COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Remember Artificial Neural Networks, supervised, unsupervised and associative memory networks, fuzzy logic and genetic algorithms.	PSO-1	K1
CO - 2	Understand ANN, supervised, unsupervised and associative memory networks, fuzzy logic and genetic algorithms.	PSO-2	K2
CO - 3	Apply ANN, supervised, unsupervised and associative memory networks, fuzzy logic and genetic algorithms.	PSO-3	K3
CO - 4	Analyze ANN, supervised, unsupervised and associative memory networks, fuzzy logic and genetic algorithms.	PSO-4	K4
CO - 5	Evaluate and Create ANN, supervised, unsupervised and associative memory networks, fuzzy logic and genetic algorithms.	PSO-5	K5, K6

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

Semester: III											Hours: 4+2
Code : 23PCS3E2A				SOFT COMPUTING							Credit: 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	5	3	4	3	4	3	5	3	3	4	3	3.64
CO - 2	2	3	4	5	4	2	2	5	3	4	2	3.27
CO - 3	3	5	3	3	3	3	3	3	5	3	3	3.36
CO - 4	2	4	5	3	5	2	2	3	4	5	2	3.36
CO - 5	4	3	3	2	3	5	4	2	3	3	5	3.36
Overall Mean Score												3.40

Result: The score for this course is **3.40** (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 = $\dfrac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	Mean Overall Score for COs= $\dfrac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

UNIT I

Introduction: Neural Networks - Application Scope of Neural Networks - Fuzzy Logic - Genetic Algorithm - Hybrid Systems - Soft Computing. **Artificial Neural Network: An Introduction:** Fundamental Concept - Basic Models of Artificial Neural Network - Important Terminologies of ANNs- McCulloch-Pitts Neuron - Linear Separability- Hebb Network.   **(12 Hours)**

UNIT II

Supervised Learning Network: Perceptron Networks - Adaptive Linear Neuron (Adaline) - Multiple Adaptive Linear Neurons - Back-Propagation Network - Radial Basis Function Network. **Associative Memory Networks:** Auto-associative Memory Network - Bidirectional Associative Memory (BAM) - Iterative Auto-associative Memory Networks.   **(12 Hours)**

UNIT III

Unsupervised Learning Networks: Kohonen Self-Organizing Feature Maps. **Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets:** Classical Sets (Crisp Sets) - Fuzzy Sets - Properties of Fuzzy Sets. **Classical Relations and Fuzzy Relations:** Fuzzy Relations. **Membership Function:** Fuzzification - Methods of Membership Value Assignments.   **(12 Hours)**

UNIT IV

Defuzzification: Lambda-Cuts for Fuzzy Sets (Alpha-Cuts) and Fuzzy Relations - Defuzzification Methods. **Fuzzy Arithmetic and Fuzzy Measures:** Fuzzy Measures. **Fuzzy Rule Base and Approximate Reasoning:** Formation of Rules - Fuzzy Inference Systems (FIS). **Fuzzy Decision Making.**   **(12 Hours)**

UNIT V

Genetic Algorithm: Introduction - Biological Background - Traditional Optimization and Search Techniques - Operators in Genetic Algorithm - Stopping Conditions for Genetic Algorithm Flow - Genetic Programming.   **(12 Hours)**

LIST OF PRACTICALS

Logic gates using Artificial Neural Network.

1. Perceptron Algorithm.
2. Back Propagation Algorithm.
3. Self-Organizing Maps.
4. Radial Basis Function Network.
5. De-Morgan's Law.
6. McCulloch Pits Artificial Neuron model
7. Simple genetic algorithm
8. Fuzzy based Logical operations
9. Fuzzy based arithmetic operations

COURSE BOOK

1. S.N. Sivanandam, S.N. Deepa, **"Principles of Soft Computing",** Wiley, Third Edition, 2019.

UNIT I	**:**	Chapters: 1.1 - 1.6, 2.1, 2.3 - 2.7
UNIT II	**:**	Chapter: 3.2 - 3.6, 4.3, 4.5, 4.7.
UNIT III	**:**	Chapters: 5.3, 10.2, 10.2, 10.3, 11.4, 12.3, 12.4.
UNIT IV	**:**	Chapters: 13.2-13.4, 14.4, 15.4, 15.8, 16.
UNIT V	**:**	Chapter: 21.1-21.3, 21.9, 21.10, 21.16

BOOKS FOR REFERENCE

1. Amit. K., "**Artificial Intelligence and Soft Computing: Behavioral and Cognitive modeling of the human brain",** CRC press, 2018.
2. Rajasekaran, S., &Pai, G. V "**Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications"**,.. PHI Learning Pvt. Ltd, 2011.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc20_cs17/preview
2. https://www.classcentral.com/course/swayam-introduction-to-soft-computing-10053
3. https://www.udemy.com/course/fuzzy-logic/
4. https://www.udemy.com/course/intro-to-fuzzy-logic-and-artificial-intelligence/

SOFTWARE DEVELOPMENT TECHNOLOGIES

Semester: III   **Hours: 4+2**

Code   : 23PCS3E2B   **Credit: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Acquire the knowledge of Micro and Azure Services, .NET Devops environment and validate deploy release process	PSO - 1	K1
CO - 2	Understand Micro and Azure Services, .NET Devops environment and validate deploy release process	PSO - 2	K2
CO - 3	Describe and Explain Micro and Azure Services, .NET Devops environment and validate deploy release process	PSO - 4	K3
CO - 4	Analyze Micro and Azure Services, .NET Devops environment and validate deploy release process	PSO - 3	K4
CO - 5	Evaluate and Create Micro, Azure Services, .NET Devops environment and validate deploy release process	PSO - 5	K5, K6

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

Semester: III							SOFTWARE DEVELOPMENT TECHNOLOGIES					Hours: 4+2	
Code : 23PCS3E2B												**Credit: 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	5	4	2	3	2	3	5	3	4	2	3	3.27	
CO - 2	3	3	4	5	4	3	3	5	3	4	3	3.64	
CO - 3	2	4	5	2	5	2	2	2	4	5	2	3.18	
CO - 4	4	5	4	3	4	2	4	3	5	4	2	3.64	
CO - 5	3	3	4	2	4	5	3	2	3	4	5	3.45	
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	Mean Overall Score for COs= Total of Mean Scores
Total No. of POs & PSOs	Total No. of COs

UNIT I

Implementing Microservices: Client to microservices communication - Interservice communication - data considerations - security - monitoring - microservices hosting platform options. **Azure Service Fabric:** What is service fabric - core concepts - supported programming models - service fabric clusters -develop and deploy applications of service fabric. **Monitoring Azure Service Fabric Clusters:** Azure application insights - resource manager template - Adding Application Monitoring to a Stateless Service Using Application Insights - Cluster monitoring -Infrastructure monitoring.   **(12 Hours)**

UNIT II

Azure Kubernetes Service (AKS): Introduction to kuber netes and AKS- AKS development tools - Deploy applications on AKS. **Monitoring Azure Kubernetes Service:** Monitoring - Azure monitor and log analytics - monitoring AKS clusters - native kubernetes dashboard - Prometheus and Grafana. **Securing Micro services**: Authentication in micro services – Implementing security using an API gateway pattern - Creating application using Ocrlot and securing APIs with Azure AD. **Database Design for Micro services:** Data stores - monolithic approach - Microservices approach -harnessing cloud computing - database options on MS Azure - overcoming application development challenges.   **(12 Hours)**

UNIT III

Building Micro service applications on Azure Stack: Azure stack - Offering IaaS - PaaS on-premises simplified - SaaS on Azure stack. **Building Microservices Applications on Azure Stack:** Azure Stack - Services Available in Azure Stack - Azure Stack Deployment Modes - Offering IaaS - PaaS On-Premises Simplified - SaaS on Azure Stack. **.NET DevOps for Azure:** DevOps introduction - The Problem - The solution. **Zero to Azure in 60 Minutes:** Deploy an App to App Service - Create the Azure App Service Web App - Deployment with Visual Studio - Deployment Slots - Continuous Integration and Deployment - Monitor and Debug.

(12 Hours)

UNIT IV

The Professional Grade DevOps Environment: The state of DevOps - A professional grade DevOps vision - DevOps architecture - tools of the professional DevOps environment - DevOps centered application. **Tracking work:** Change your Process template - Types of work items - Customizing your process - Working with the process. **Tracking code:** How many repositories - what should be in your Git repository - The structure of the Git repository-Choosing a branching pattern -Useful Tips in Azure repos configuration - How does Github Fit in - **Building code:** Structure of a build - using builds with .NET core and Azure pipelines. **(12 Hours)**

UNIT V

Validating the code: Strategy for defect detection - Implementing defect detection. **Release candidate creation:** Designing your release candidate architecture - Azure artifacts workflow for release candidates. **Deploying the release:** Designing deployment pipeline - Implementing the deployment in Azure pipelines. **Operating and monitoring the release:** Principles, Architectures for observability - Jumpstarting observability. **(12 Hours)**

LIST OF PRACTICALS

1. Deploy Version Control System / Source Code Management, install git and create a GitHub account.

2. Perform various GIT operations on local and Remote repositories using GIT Cheat-Sheet

3. Continuous Integration: install and configure Jenkins with Maven/Ant/Gradle to setup a build Job.

4. Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server.

5. Implement Jenkins Master-Slave Architecture and scale your Jenkins standalone implementation by implementing slave nodes.

6. Setup and Run Selenium Tests in Jenkins Using Maven.

7. Implement Docker Architecture and Container Life Cycle, install Docker and execute docker commands to manage images and interact with containers.

8. Implement Dockerfile instructions, build an image for a sample web application using Dockerfile.

9. Install and Configure Pull based Software Configuration Management and provisioning tools using Puppet.

10. Implement LAMP/MEAN Stack using Puppet Manifest.

COURSE BOOKS:

1. Harsh Chawla and Hemant Kathuria **"Building Microservices Applications on Microsoft Azure- Designing, Developing, Deploying, and Monitoring"**, Apress, 2019.

        UNIT I   : Chapters   : 2,3,4.

        UNIT II   : Chapters   : 5,6,7,8

        UNIT III   : Chapter   : 9

2. Jeffrey Palermo, **".NET DevOps for Azure A Developer's Guide to DevOps Architecture the Right Way"**, Apress, 2019.

        UNIT III   : Chapters   : 1, 2.

        UNIT IV   : Chapters   : 3,4,5,6.

        UNIT V   : Chapters   : 7,8,9,10.

BOOKS FOR REFERENCE

1. Karl Matthias and Sean P. Kane, **"Docker: Up and Running"** O'Reilly Publication, Second Edition 2018.

2. Addison, **"A Software Architects Perspective", Len Bass, Ingo Weber, Liming Zhu DevOps",** Wesley-Pearson Publication, First Edition 2015.

3. John Ferguson Smart Jenkins, **"The Definitive Guide"**, O'Reilly Publication, First Edition 2011.

WEB RESOURCES

1. https://www.udemy.com/course/mta-98-361-software-development-fundamentals-preparation-exam/

2. https://www.udemy.com/course/software-development-master-class-for-absolute-beginners-1/

3. https://www.udemy.com/course/software-development-master-class-for-absolute-beginners-1/

4. https://www.udemy.com/course/software-development-lifecycle-methodologies/

5. https://www.udemy.com/course/software-development-master-class-intermediate-csharp/

SOCIAL NETWORKS

Semester: III   **Hours: 4+2**
Code   : 23PCS3E2C   **Credit: 4**
COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Recognize RSS Feeds, blogs, building wordpress powered website, social networking, micro-blogging, widgets, badges and optimizing website	PSO - 1	K1
CO-2	Discuss RSS Feeds, blogs, building wordpress powered website, social networking, micro-blogging, widgets, badges and optimizing website	PSO - 2	K2
CO-3	Demonstrate RSS Feeds, blogs, building wordpress powered website, social networking, micro-blogging, widgets, badges and optimizing website	PSO - 4	K3
CO-4	Explain RSS Feeds, blogs, building wordpress powered website, social networking, micro-blogging, widgets, badges and optimizing website	PSO - 3	K4
CO-5	Develop RSS Feeds, blogs, building wordpress powered website, social networking, micro-blogging, widgets, badges and optimizing website	PSO - 5	K5, K6

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

Semester: III											Hours: 4+2
Code : 23PCS3E2C	\multicolumn{10}{c}{SOCIAL NETWORKS}										Credit: 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	5	4	2	3	2	3	5	3	4	2	3	3.27
CO - 2	3	3	4	5	4	3	3	5	3	4	3	3.64
CO - 3	2	4	5	3	5	2	2	3	4	5	2	3.36
CO - 4	4	5	4	3	4	2	4	3	5	4	2	3.64
CO - 5	3	3	3	2	3	5	3	2	3	3	5	3.18
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

UNIT I

Introduction: Social Media Strategy-Important First Decisions Websites, Blogs and RSS Feeds - MappingStrategy -**Preparation:** Gathering Content for Blog Posts -**RSS Feeds and Blogs**- RSS Feeds-The-Blogs-Optimizing and Promoting your Blog and RSS Feed. **(12 Hours)**

UNIT II

Building a Word Press Powered Website: Using Word Press as A CMS - Diversity of Word Press Sites-The Anatomy of a Word Press Site -a Brief Look at the Word Press Dashboard - Planning your Site - Themes - Plug-ins - Setting up Sidebars - Building your Pages - Posting Blog Entries. **Podcasting, Vidcasting, & Webcasting**: Publishing Options for Podcast- Creating and Uploading Podcast Episodes-Publishing Podcast Optimizing Podcast- Webcasting. **(12 Hours)**

UNIT III

Social Networking & Micro-Blogging: Facebook - LinkedIn-Twitter-Other Social Networking Tools-Creating Own Social Network. **Social Bookmarking & Crowd-Sourcing:** Social Bookmarking- Crowd-Sourcing - Preparation and Tracking your Progress. **Media Communities:** Image Sharing Sites-Video Sharing Sites-Document Sharing sits -Searching and Search Engine Placement-Connecting With Others. **(12 Hours)**

UNIT IV

Widgets and Badges: Highlighting Social Web Presence-Sharing and Syndicating Content - Making Site More Interactive-Promoting Products and Making Money-Using Widgets in Word Press-Widget Communities and Directories- Working Widgets into Your Strategy. **Social Media Newsrooms:** Social Media Newsroom - Populating The Newsroom-Social Media News Releases-Social Media Newsroom Examples. **More Social Tools**: Social Calendars and Event Tools -Social Pages.

(12 Hours)

Unit V

Pulling it All Together: Integration Methods - Integration Tools - Optimizing Website - Streamlining Social Web Presence - Mapping Own Integration Plan - **Looking to the Future:** Web 3.0 - The Semantic Web - Cloud Computing - The Mobile Web - Keeping Eye on the social media Pie- Measuring Success - Know the Goals - Search Optimization - Tracking Tactics - Tools to Help Measure - Social Analytics Services. **(12 Hours)**

<div align="center">**PRACTICAL**   **(30 Hours)**</div>

LIST OF PRACTICALS

1. Creating and Exploring Twitter's API
2. Analyzing and visualizing tweets and tweet entities with frequency analysis
3. Creating and Exploring Facebook's Social Graph API
4. Analyzing the Facebook's Social Graph connections
5. Creating and Exploring LinkedIn API
6. Downloading LinkedIn connections as a CSV file
7. Creating and Exploring Google+ API
8. Creating and querying Human Language Data with TF-IDF
9. Creating and Exploring GitHub's API
10. Analyzing GitHub interest graph

COURSE BOOK

1. Deltina hay, **"The social media survival guide: strategies, tactics, and tools for succeeding in the social web",** Quill Driver Books, 2011.

UNIT I	:	Chapters : 1- 3
UNIT II	:	Chapters : 4, 5
UNIT III	:	Chapters : 6- 8
UNIT IV	:	Chapters : 9-11
UNIT V	:	Chapters : 12-14

BOOKS FOR REFERENCE

1. Melody Karle, **"A Social Media Survival Guide: How to Use the Most Popular Platforms and Protect Your Privacy"**, Rowman & Littlefield Publications, 2022
2. Paul Borgese, Sherrie Madia, **"The Social Media Survival Guide: Everything You Need to Know to Grow Your Business Exponentially with Social Media",** Full Court Press; Second Edition, 2010.
3. Miriam Salpeter, **"Social Networking for Career Success",** Learning Express Publication, Second Edition, 2013

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc20_cs78/preview
2. https://www.udemy.com/course/build-social-network-in-20-days/
3. https://www.udemy.com/course/learn-buddypress-build-a-social-network-with-wordpress/
4. https://www.udemy.com/course/wordpress-for-beginners-course/
5. https://www.udemy.com/course/complete-wp-course/

MOBILE COMPUTING

Semester: III   **Hours: 6**
Code   : 23PCS3SE3   **Credit: 3**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE, THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Diagnose wireless transmission, medium access control, telecommunication systems, wireless LAN and mobility	PSO-2	K1
CO-2	Deliberate wireless transmission, medium access control, telecommunication systems, wireless LAN and mobility	PSO-1	K2
CO-3	Establish wireless transmission, medium access control, telecommunication systems, wireless LAN and mobility	PSO-4	K3
CO-4	Elucidate wireless transmission, medium access control, telecommunication systems, wireless LAN and mobility	PSO-3	K4
CO-5	Develop wireless transmission, medium access control, telecommunication systems, wireless LAN and mobility	PSO-5	K5, K6

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

Semester: III						MOBILE COMPUTING					Hours: 6
Code : 23PCS3SE3											Credit: 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	2	3	4	5	4	4	2	5	3	4	4	3.64
CO - 2	5	3	4	4	4	3	5	4	3	4	3	3.82
CO - 3	4	3	5	4	5	3	4	4	3	5	3	3.91
CO - 4	4	5	3	3	3	3	4	3	5	3	3	3.55
CO - 5	4	3	4	3	4	5	4	3	3	4	5	3.82
Overall Mean Score												3.75

Result: The score for this course is **3.75** (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: Applications - A short History of wireless communication - A Simplified reference model - **Wireless transmission:** Frequencies for radio transmission - Regulations - Signals -Antennas - Signal propagation - Multiplexing -Modulation. **(18 Hours)**

UNIT II

Spread spectrum -Cellular systems. **Medium access control:** SDMA, FDMA, TDMA- CDMA. **(18 Hours)**

UNIT III

Telecommunication systems: GSM - DECT-TETRA- UMTS and IMT-2000 - **Satellite Systems:** Applications - Basics - Routing - Localization - Handover.

(18 Hours)

UNIT IV

Wireless LAN: Infra red vs. radio transmission - Infrastructure and ad-hoc network - IEEE 802.11 - Blue tooth. **Mobile network layer:** Mobile IP **(18 Hours)**

UNIT V

Support for mobility: File systems- WAP. Mobile ad-hoc networks - MANET Characteristics - Classification of MANETs, Routing of MANETs, Proactive Routing Protocol - The DSDV protocol - Reactive Routing Protocols. **(18 Hours)**

COURSE BOOKS

1. Jochen Schiller, **"Mobile Communications",** Second Edition, Pearson Education, 2013.

UNIT I:	Chapters: 1.1,1.2,1.5, 2.1 - 2.6
UNIT II:	Chapter 2.7-2.8, 3.2- 3.5
UNIT III:	Chapters: 4.1- 4.4, 5.2-5.6
UNIT IV:	Chapters: 7.1 - 7.3, 7.5, 8.1
UNIT V:	Chapter: 10.3.1 - 10.3.6

2. Kum Kum Garg, **"Mobile Computing Theory and Practice",** Pearson Education, 2014.

UNIT V:	Chapter: 6.1, 6.2, 6.4 - 6.6

BOOKS FOR REFERENCE

1. Asoke K Talukder, Hasan Ahmed, Roopa Yavagal, **"Mobile Computing: Technology, Applications and Service Creation"**, McGraw Hill Education, 2017

2. Raj Kamal, **"Mobile Computing",** Oxford University Press, Third Edition, 2018

3. Vijay G. Yangalwar, Nirali Prakashan **"Mobile And Wireless Communication"**, Publication, 2020

WEB RESOURCES

1. https://www.udemy.com/course/5g-network-training-key-technologies-architecture-and-protocols/

2. https://www.udemy.com/course/5g-core-architectures-concepts-and-call-flows/

3. https://www.udemy.com/course/5g-4g-lte-3g-2g-cellular-mobile-communications-wireless/

4. https://www.udemy.com/course/telecom-business-support-system-bss-operation-support-system-oss-etom/

INTERNSHIP CUM MINI PROJECT

Semester: III

Code   : 23PCS3IN1   **Credit: 2**

COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO-1	Recall and summarize the basic scientific concepts involved in concerned internship site/industry.	PSO-1	K1
CO-2	Understand the principles and methodologies employed during the Internship.	PSO-2	K2
CO-3	Apply the subject knowledge and skills to conduct experiments, collection of data to be an Entrepreneur.	PSO-3	K3
CO-4	Analyze the steps involved in the training process.	PSO-4	K4
CO-5	Critically assess the effectiveness of experimental techniques.	PSO-5	K5

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

Semester: III							INTERNSHIP CUM MINI PROJECT					
Code : 23PCS3IN1												Credit: 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	5	3	3	3	3	3	5	3	3	3	3	3.36
CO - 2	4	4	3	5	3	3	4	5	4	3	3	3.73
CO - 3	3	5	3	4	3	4	3	4	5	3	4	3.73
CO - 4	4	3	5	3	5	3	4	3	3	5	3	3.73
CO - 5	4	4	3	4	3	5	4	4	4	3	5	3.91
Overall Mean Score												**3.69**

Result: The score for this course is **3.69** (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

During the summer holidays of the Second Semester, students should complete an Internship cum Mini Project and submit the report. Viva-voce will be conducted during the Semester Lab Examination.

NATURAL LANGUAGE PROCESSING

Semester: IV   **Hours: 6**

Code   : 23PCS4C10   **Credit: 4**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Review the fundamentals, processing, categorizing and tagging words, extracting information, feature-based grammars and managing linguistic data	PSO-1	K1
CO - 2	Apply language processing, categorizing and tagging words, extracting information, feature-based grammars and managing linguistic data using python	PSO-3	K2
CO - 3	Identify language processing, categorizing and tagging words, extracting information, feature-based grammars and managing linguistic data	PSO-2	K3
CO - 4	Analyze language processing, categorizing and tagging words, extracting information, feature-based grammars and managing linguistic data	PSO-4	K4
CO - 5	Reframe and Develop language processing, categorizing and tagging words, extracting information, feature-based grammars and managing linguistic data	PSO-5	K5, K6

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

Semester: IV											Hours: 6
Code : 23PCS4C10		NATURAL LANGUAGE PROCESSING									Credit: 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	5	3	4	2	4	3	5	2	3	4	3	3.45
CO - 2	4	5	2	4	2	3	4	4	5	2	3	3.45
CO - 3	4	3	3	5	3	4	4	5	3	3	4	3.73
CO - 4	3	4	5	4	5	3	3	4	4	5	3	3.91
CO - 5	3	3	2	2	2	5	3	2	3	2	5	2.91
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

Language Processing and Python: Computing with Language: Texts and Words - A Closer Look at Python: Texts as Lists of Words - Computing with Language: Simple Statistics - Back to Python: Making Decisions and Taking Control - Automatic Natural Language Understanding. **Processing Raw Text:** Accessing Text from the Web and from Disk - Strings: Text Processing at the Lowest Level - Text Processing with Unicode - Regular Expressions for Detecting Word Patterns - Useful Applications of Regular Expressions - Normalizing Text - Regular Expressions for Tokenizing Text - Segmentation - Formatting: From Lists to Strings   **(18 Hours)**

UNIT II

Writing Structured Programs: Back to the Basics - Sequences - Questions of Style - Functions: The Foundation of Structured Programming - Doing More with Functions- Program Development - Algorithm Design - A Sample of Python Libraries. **Categorizing and Tagging Words:** Using a Tagger - Tagged Corpora Mapping Words to Properties Using Python Dictionaries - Automatic Tagging - N-Gram Tagging - Transformation-Based Tagging - How to Determine the Category of a Word.   **(18 Hours)**

UNIT III

Learning to Classify Text: Supervised Classification - Further Examples of Supervised Classification - Evaluation - Decision Trees - Naive Bayes Classifiers - Maximum Entropy Classifiers - Modeling Linguistic Patterns. **Extracting Information from Text:** Information Extraction - Chunking - Developing and Evaluating Chunkers - Recursion in Linguistic Structure - Named Entity Recognition - Relation Extraction   **(18 Hours)**

UNIT IV

Analyzing Sentence Structure: Some Grammatical Dilemmas - Use of Syntax-Context-Free Grammar - Parsing with Context-Free Grammar - Dependencies and Dependency Grammar - Grammar Development. **Building Feature-Based Grammars:** Grammatical Features - Processing Feature Structures - Extending a Feature-Based Grammar.   **(18 Hours)**

UNIT V

Analyzing the Meaning of Sentences: Natural Language Understanding - Propositional Logic - First-Order Logic - The Semantics of English Sentences - Discourse Semantics. **Managing Linguistic Data:** Corpus Structure: A Case Study - The Life Cycle of a Corpus - Acquiring Data - Working with XML - Working with Toolbox Data - Describing Language Resources Using OLAC Metadata. **(18 Hours)**

COURSE BOOK

1. Steven Bird, Ewan Klein, and Edward loper, **"Natural Language Processing with Python"**, First Edition, O'Reilly Media Inc., 2009.

   UNIT I   **:**   Chapters :   1, 3

   UNIT II   **:**   Chapters :   4, 5

   UNIT III **:**   Chapters :   6, 7

   UNIT IV **:**   Chapters :   8, 9

   UNIT V   **:**   Chapters   :   10, 11

BOOKS FOR REFERENCE

1. Rajesh Arumugam, Rajalingappa Shanmugamani, **"Hands-On Natural Language Processing with Python: A practical guide to applying deep learning architectures to your NLP applications",** First Edition, Packt Publishing, 2018.

2. Thushan Ganegedara, **"Natural Language Processing with Tensorflow: Teach language to machines using Python's deep learning"**, First Edition, Packt Publishing 2018

3. Mathangi Sri, **"Practical Natural Language Processing with Python: With Case Studies from Industries Using Text Data at Scale"**, First Edition, Apress, 2020.

WEB RESOURCES

1. https://www.udemy.com/course/natural-language-processing-nlp-for-beginners-using-nltk-in-

2. https://www.udemy.com/course/introduction-to-nlp-

3. https://www.udemy.com/course/introduction-to-nlp-live-seminar/

4. https://onlinecourses.nptel.ac.in/noc19_cs56/preview

5. https://onlinecourses.nptel.ac.in/noc19_cs57/preview

SOLUTION ARCHITECTURE

Semester: IV   **Hours: 4+2**

Code   : 23PCS4E3A   **Credit: 3**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Comprehend the solution architects in an organization, attributes of the solution architecture, design, design patterns	PSO-1	K1
CO - 2	Understand solution architects in an organization, attributes of the solution architecture, design, design patterns	PSO-3	K2
CO - 3	Apply solution architects in an organization, attributes of the solution architecture, design, design patterns	PSO-2	K3
CO - 4	Analyze the solution architects in an organization, attributes of the solution architecture, design, design patterns	PSO-4	K4
CO - 5	Optimize the solution architects in an organization, attributes of the solution architecture, design, design patterns	PSO-5	K5, K6

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

Semester: IV							SOLUTION ARCHITECTURE					Hours: 4+2
Code : 23PCS4E3A												Credit: 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	5	3	2	4	2	3	5	4	3	2	3	3.27
CO - 2	3	5	3	4	3	2	3	4	5	3	2	3.36
CO - 3	2	4	3	5	3	3	2	5	4	3	3	3.36
CO - 4	3	4	5	2	5	2	3	2	4	5	2	3.36
CO - 5	2	3	4	3	4	5	2	3	3	4	5	3.45
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	Mean Overall Score for COs= Total of Mean Scores
Total No. of POs & PSOs	Total No. of COs

THEORY   **(60 Hours)**

UNIT I

The meaning of solution architecture: Evolution of solution architecture - The benefits of Solution Architecture - Solution architecture in the public cloud - **Solution Architects in an Organization:** Types of solution architect role - Understanding a solution architect's responsibilities - **Attributes of the Solution Architecture:** Scalability and elasticity - Security and compliance - Cost optimization and budget   **(12 Hours)**

UNIT II

Principles of Solution Architecture Design: Scaling workload - Building resilient architecture - Design for performance - Using replaceable resources - **Cloud Migration and Hybrid Cloud Architecture Design:** Benefits of cloud-native architecture - Creating a cloud migration strategy - Steps for cloud migration - Creating a hybrid cloud architecture - Designing a cloud-native architecture

                (12 Hours)

UNIT III

Solution Architecture Design Patterns: Building an n-tier layered architecture - Creating multi-tenant SaaS-based architecture - Building stateless and stateful architecture designs - Understanding SOA - **Performance Considerations**: Design principles for architecture performance - Technology selection for performance optimization - Managing performance monitoring.   **(12 Hours)**

UNIT IV

Architectural Reliability Considerations: Design principles for architectural reliability - Technology selection for architecture reliability - Improving reliability with the cloud - **Operational Excellence Considerations:** Designing principles for operational excellence - Selecting technologies for operational excellence - Achieving operational excellence in the public cloud   **(12 Hours)**

UNIT V

Cost Considerations: Design principles for cost optimization - Techniques for cost optimization - Cost optimization in the public cloud - **Architecting Legacy Systems**: Learning the challenges of legacy systems - Defining a strategy for system modernization - Looking at legacy system modernization techniques - Defining a cloud migration strategy for legacy systems   **(12 Hours)**

LIST OF PRACTICALS

1. Managing Virtual Private Cloud
2. Creating and Configuring Internet Gateways
3. Configuring Routing Tables
4. Working with Amazon Elastic Cloud Compute (EC2)
5. Connecting EC2 Linux instance using PuTTY, Gitbash and Console
6. Recovering and connecting EC2 instance if the SSH key is lost
7. Creating and Configuring Elastic Load Balancer
8. Scheduling Auto Snapshot of volumes
9. Configuring Centralized Log Management using Cloud Watch Log
10. Connecting OpenVPN server

COURSE BOOK

1. Saurabh Shrivastava and Neelanjali Srivastav, **"Solutions Architect's Handbook"**, Packt Publishing, 2020.

    UNIT I   :   Chapters :   1.2,1.4,1.5,2.1,2.2, 3.1,3.9,3.10
    UNIT II   :   Chapters :   4.1-4.4, 5.1-5.5
    UNIT III :   Chapters :   6.1-6.4, 7.1-7.3
    UNIT IV :   Chapters :   9, 10
    UNIT V   :   Chapters :   11, 14

BOOKS FOR REFERENCE

1. Alan McSweeney, **"Introduction to Solution Architecture",** Kindle Edition, 2019
2. Bernard, Scott A. **"An introduction to holistic enterprise architecture",** Author House, 2020.

WEB RESOURCES

1. https://www.udemy.com/course/practical-solution-architecture/
2. https://www.udemy.com/course/aws-certified-solutions-architect-associate-saa-c03/
3. https://www.udemy.com/course/how-to-become-an-outstanding-solution-architect/
4. https://www.udemy.com/course/aws-solutions-architect-professional/

BLOCK CHAIN TECHNOLOGIES

Semester: IV Hours: 4+2

Code   : 23PCS4E3B Credits: 3

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Remember the basics of Blockchain, Public Key Cryptography, Bitcoin, Alternative Coins, Development Tools and Frameworks	PSO-1	K1
CO - 2	Understand the Blockchain concepts, Public Key Cryptography, Bitcoin, Alternative Coins, Development Tools and Frameworks	PSO-3	K2
CO - 3	Apply Blockchain, Public Key Cryptography, Bitcoin, Alternative Coins, Development Tools and Frameworks	PSO-2	K3
CO - 4	Analyze Blockchain, Public Key Cryptography, Bitcoin, Alternative Coins, Development Tools and Frameworks	PSO-4	K4
CO - 5	Evaluate and create Blockchain, Public Key Cryptography, Bitcoin, Alternative Coins, Development Tools and Frameworks	PSO-5	K5, K6

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

Semester: IV											Hours: 4+2
Code : 23PCS4E3B	**BLOCK CHAIN TECHNOLOGIES**										Credit: 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	5	3	4	4	4	3	5	4	3	4	3	3.82
CO - 2	4	5	2	4	2	3	4	4	5	2	3	3.45
CO - 3	4	4	3	5	3	3	4	5	4	3	3	3.73
CO - 4	4	4	5	3	5	3	4	3	4	5	3	3.91
CO - 5	3	3	4	2	4	5	3	2	3	4	5	3.45
Overall Mean Score												**3.67**

Result: The score for this course is **3.67** (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	Mean Overall Score for COs= Total of Mean Scores
Total No. of POs & PSOs	Total No. of COs

THEORY (60 Hours)

UNIT I

Introduction to Cryptography & Cryptocurrencies: Cryptographic Hash Functions - Hash Pointers and Data Structures - Digital Signatures - Public Keys as Identities - A Simple Cryptocurrency. **How Bitcoin Achieves Decentralization:** Centralization vs. Decentralization - Distributed consensus - Consensus without identity using a block chain. (12 Hours)

UNIT II

Mechanics of Bitcoin: Bitcoin transactions - Bitcoin Scripts - Applications of Bitcoin scripts - Bitcoin blocks - The Bitcoin network. **How to Store and Use Bitcoins:** Simple Local Storage - Hot and Cold Storage - Splitting and Sharing Keys - Online Wallets and Exchanges - Payment Services - Transaction Fees. (12 Hours)

UNIT III

Bitcoin Mining: Task of Bitcoin miners - Mining Hardware - Mining incentives and strategies. **Bitcoin and Anonymity:** Anonymity Basics - how to De-anonymize Bitcoin - Mixing - Decentralized Mixing - Zerocoin and Zerocash. (12 Hours)

UNIT IV

Alternative Mining Puzzles: Essential Puzzle Requirements - ASIC-resistant puzzles. **Bitcoin as a Platform:** Bitcoin as an Append-Only Log - Bitcoins as "Smart Property" - Secure Multi-Party Lotteries in Bitcoin. (12 Hours)

UNIT V

Altcoins and the Cryptocurrency Ecosystem: A few Altcoins in detail - Relationship between Bitcoin and Altcoins - Merge Mining - Atomic Cross-chain Swaps - Ethereum and Smart Contracts (12 Hours)

PRACTICAL: **(30 Hours)**

LIST OF PRACTICALS

1. Create a Public Ledger and Private Ledger with the various attributes like Access, Network Actors, Native token, Security, Speed and examples.
2. Build and Deploy MultiChain private Blockchain
3. Write Hello World smart contract in a higher programming language (Solidity)
4. Construct the Naive block chain
5. Construct and deploy your contract (Use deploy method)
6. Set up a Regtest environment
7. Build a payment request URI
8. Hashcash implementation
9. Develop a toy application using Blockchain
10. Create a simple wallet transaction from one account to another account using Metamask.

COURSE BOOK

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, **"Bitcoin and Cryptocurrency Technologies",** Princeton University Press, 2016.

         UNIT I   **:** Chapters: 1.1 - 1.5, 2.1 - 2.3
         UNIT II   **:** Chapters: 3.1 - 3.5, 4.1 - 4.7
         UNIT III **:** Chapters: 5.1, 5.2, 5.5, 6.1 - 6.5
         UNIT IV **:** Chapters: 8.1, 8.2, 9.1 - 9.3
         UNIT V   **:** Chapter: 10.2, 10.3 - 10.7.

BOOKS FOR REFERENCE

1. Andreas Antonopoulos, **"Mastering Bitcoin: Programming the open block chain",** Oreilly Publishers, 2017.
2. Chandramouli Subramanian, Asha A George, Abhilash K A, Meena Karthikeyan, **"Blockchain Technology",** Universities Press Pvt. Ltd., 2020
3. Kumar Saurabh, Ashutosh Saxena, **Blockchain Technology",** Wiley Publications, 2020

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_cs44/preview
2. https://onlinecourses.swayam2.ac.in/aic21_ge01/preview
3. https://onlinecourses.nptel.ac.in/noc24_cs15/preview
4. https://www.udemy.com/course/build-your-blockchain-az/
5. https://www.udemy.com/course/learn-blockchain-technology-and-cryptocurrency-for-beginners/

OPTIMIZATION TECHNIQUES

Semester: IV   **Hours: 4 + 2**

Code   : 23PCS4E3C   **Credit: 3**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Define Linear Programming Problem, Transportation and Assignment Models, and Simplex Method	PSO-1	K1
CO - 2	Explain, Transportation and Assignment Models, and Simplex Method	PSO-3	K2
CO - 3	Apply Transportation and Assignment Models, and Simplex Method in real world situations.	PSO-2	K3
CO - 4	Analyze LPP, Transportation and Assignment Models, and Simplex Method	PSO-5	K4
CO - 5	Evaluate and Create LPP, Transportation and Assignment Models, and Simplex Method	PSO-4	K5, K6

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

Semester: IV						OPTIMIZATION TECHNIQUES					Hours: 4+2
Code : 23PCS4E3C											Credit: 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	5	3	3	3	3	3	5	3	3	3	3	3.36
CO - 2	4	5	3	3	3	3	4	3	5	3	3	3.55
CO - 3	2	3	3	5	3	4	2	5	3	3	4	3.36
CO - 4	4	3	4	3	4	5	4	3	3	4	5	3.82
CO - 5	4	3	5	3	5	3	4	3	3	5	3	3.73
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

LINEAR PROGRAMMING PROBLEM: Mathematical Formulation: Introduction - Linear Programming Problem - Mathematical Formulation of the Problem. **LINEAR PROGRAMMING PROBLEM: Graphical Solution and Extension:** Introduction: Graphical Solution Method - Some Exceptional Cases - Canonical and Standard forms of LPP.   **(12 Hours)**

UNIT II

LINEAR PROGRAMMING PROBLEM: Simplex Method: Introduction - Fundamental Properties of Solutions - The Computational Procedure - Use of Artificial Variables.   **(12 Hours)**

UNIT III

TRANSPORTATION PROBLEM: Introduction - LP Formulation of the Transportation Problem - Existence of solution in T.P. - Duality in Transportation Problem - The Transportation Table - Loops in Transportation Tables - Triangular Basics in a T.P - Solution of a Transportation Problem - Finding an initial Basic Feasible Solution - Test for Optimality - Degeneracy in Transportation Problem - Transportation Algorithm (MODI Method) - Stepping Stone Solution Method.

         (12 Hours)

UNIT IV

ASSIGNMENT PROBLEM: Introduction -Mathematical Formulation of the Problem - Solution Methods of Assignment Problem - Special Cases in Assignment Problems - A Typical Assignment Problem - Dual of the Assignment Method - The Travelling Salesman Problem.   **(12 Hours)**

UNIT V

NETWORK SCHEDULING BY PERT/CPM: Introduction - Network: Basic Components - Logical Sequencing - Rules of Network Construction - Concurrent Activities - Critical Path Analysis - Probability Consideration in PERT - Distinction between PERT and CPM.   **(12 Hours)**

LIST OF PRACTICALS

1. Graphical Method

2. Simplex algorithm

3. North-West Corner algorithm

4. Least Cost algorithm

5. Vogel's Approximation Algorithm

6. Modi algorithm

7. Travelling Sales man algorithm

8. Steepest Descent algorithm

COURSE BOOK

1. Kanti Swarup, P. K. Gupta and Man Mohan, **"Operations Research",** Sultan Chand and Sons, New Delhi, Nineteenth Edition, s2021

    UNIT I: Chapters: 2 (2.1 - 2.3),3 (3.1 - 3.3 , 3.5)

    UNIT II: Chapters: 4 (4.1 - 4.4),10 (10.1 - 10.14)

    UNIT III: Chapter:10 (10. 1 - 10.10, 10.12 -10.14)

    UNIT IV: Chapter: 11 (11. 1 - 11.7)

    UNIT V: Chapter: 25 (25. 1 - 25.8)

BOOKS FOR REFERENCE

1. Frederick S. Hillier, Gerald J. Lieberman, Bodhibroto Nag, Preetam Basu, **"Introduction to Operations Research"** McGraw Hill Publications, Eleventh Edition, 2021

2. J.K. Sharma, **"Operation Research"**, Laxmi Publications, 2017

3. **",** Hamdy A. Taha, **"Operations Research: An Introduction** Pearson, 2010

WEB RESOURCES

1. https://www.udemy.com/course/optimization-basics

2. https://www.udemy.com/course/optimization-with-metaheuristics

3. https://onlinecourses.nptel.ac.in/noc24_me56/preview

4. https://www.udemy.com/course/optimisation/

INDUSTRY BASED PROJECT

Semester: IV   **Hours: 16**

Code   : 23PCS4R01   **Credit: 14**

COURSE OUTCOMES:

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO - 1	Do literature survey in their respective field and identify a problem.	PSO-1	K1
CO - 2	Understand the various methods involved in solving the problem.	PSO-2	K2
CO - 3	Adopt suitable analytical techniques to complete the research.	PSO-3	K3
CO - 4	Improve their presentation skills through reviews.	PSO-4	K4
CO - 5	Compile their research findings.	PSO-5	K5, K6

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

Semester: IV						INDUSTRY BASED PROJECT					Hours: 16
Code : 23PCS4R01											Credit: 14

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	3	3	3	3	3	5	3	3	3	3	3.36
CO - 2	4	4	3	5	3	3	4	5	4	3	3	3.73
CO - 3	3	5	3	4	3	4	3	4	5	3	4	3.73
CO - 4	4	3	5	3	5	3	4	3	3	5	3	3.73
CO - 5	4	4	3	4	3	5	4	4	4	3	5	3.91
Overall Mean Score												3.69

Result: The score for this course is **3.69** (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 = $\dfrac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	Mean Overall Score for COs = $\dfrac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

REGULATIONS FOR DISSERTATION WORK OF INDUSTRY BASED PROJECT

❖ Students should attach themselves with well-reputed Industry/ Company/ Institutions to do their two months dissertation work.

❖ The review of the dissertation will be carried out periodically.

❖ The student should submit TWO copies of their dissertation work.

❖ The students may use Power Point presentation during their dissertation Viva-Voce examinations.

TRAINING FOR COMPETITIVE EXAMINATIONS

Semester: IV   Hours: 2
Code   : 23PCS4SE4   Credit: 1
COURSE OUTCOMES

CO. NO.	UPON COMPLETION OF THIS COURSE THE STUDENTS WILL BE ABLE TO	PSO ADDRESSED	COGNITIVE LEVEL
CO – 1	Grasps basic programming concepts, applies algorithms for problem-solving, operating system concepts, database concepts Networking, Software Engineering and employs object-oriented principles.	PSO-1	K1
CO – 2	Understand basic programming concepts, applies algorithms for problem-solving, operating system concepts, database concepts Networking, Software Engineering and employs object-oriented principles.	PSO-2	K2
CO – 3	Applies programming concepts, applies algorithms for problem-solving, operating system concepts, database concepts Networking, Software Engineering and employs object-oriented principles.	PSO-5	K3
CO - 4	Analyzes basic programming concepts, applies algorithms for problem-solving, operating system concepts, database concepts Networking, Software Engineering and employs object-oriented principles.	PSO-4	K4
CO - 5	Evaluates basic programming concepts, applies algorithms for problem-solving, operating system concepts, database concepts Networking, Software Engineering and employs object-oriented principles.	PSO-3	K5, K6

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

Semester: I V											
Code : 23PCS4SE4											

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	3	4	4	4	3	5	4	3	4	3	3.82
CO – 2	3	3	3	5	3	3	3	5	3	3	3	3.36
CO – 3	3	3	3	4	3	5	3	4	3	3	5	3.55
CO – 4	3	3	5	3	5	3	3	3	3	5	3	3.55
CO – 5	3	5	3	3	3	3	3	3	5	3	3	3.36
Overall Mean Score												3.53

Title row: "TRAINING FOR COMPETITIVE EXAMINATIONS" with "Hours: 2" and "Credit: 1"

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

Programming Fundamentals: Basic concepts of programming languages (variables, data types, operators, control structures) - Algorithms and problem-solving techniques - Object-oriented programming principles - Data structures (arrays, linked lists, stacks, queues, trees, graphs) - Basic complexity analysis (Big O notation)   **(6 Hours)**

UNIT II

Computer Architecture and Operating Systems: Basics of computer organization and architecture - CPU, memory, and I/O devices - Operating system concepts (processes, threads, scheduling, memory management, file systems) - Virtualization and cloud computing   **(6 Hours)**

UNIT III

Database Management Systems (DBMS): Relational database concepts (tables, rows, columns) - SQL (Structured Query Language) fundamentals - Database design principles (ER diagrams, normalization) - Indexing and querying techniques - Transaction management and concurrency control.   **(6 Hours)**

UNIT IV

Networking and Internet Technologies: Basics of computer networks (protocols, OSI model, TCP/IP) - Internet technologies (HTTP, HTTPS, DNS, FTP) - Network security (cryptography, authentication, firewalls) - Web development basics (HTML, CSS, JavaScript) - Client-server architecture and Restful APIs.

(6 Hours)

UNIT V

Software Engineering: Software development life cycle models (Waterfall, Agile, etc.) - Requirements engineering and software specification   - Software design principles and patterns   - Software testing techniques (unit testing, integration testing, etc.) - Software maintenance and quality assurance.   **(6 Hours)**

BOOKS REFERENCE

1. **"Programming in C++"** by E. Balagurusamy. 4th Edition, published in the year 2008.

2. "**Computer System Architecture**", M. Morris Mano, Rajib Mall, Third Edition, Prentice Hall of India Private Limited, New Delhi, Reprint 2017.

3. **"Operating Systems Internals and Design Principles",** William Stallings. Pearson Education Pvt Ltd., 7th Edition, 2014.

4. **"Fundamentals of Database Systems",** Global Edition, Ramez Elmasri, Shamkant B. Navathe, Pearson Publications, Seventh Edition, 2017.

5. **"Advanced Internet Protocols, Services and Applications"**, Eiji Oki, Roberto Rojas-Cessa, Mallikarjun Tatipamula, Christian Vogt, Copyright © 2012 by John Wiley & Sons, Inc.

6. **"Fundamentals of Software Engineering",** Rajib Mall, PHI Learning Private Limited, Delhi, Fifth Edition, 2019.

WEB RESOURCES

7. https://onlinecourses.nptel.ac.in/noc23_cs99/preview

8. https://www.udemy.com/course/python-beginner-to-advanced-level-course/

9. https://www.coursera.org/specializations/python

10. https://www.coursera.org/learn/python-crash-course

11. https://www.udemy.com/course/python-coding/

12. https://ww.coursera.org/learn/codio-advanced-django-advanced-drf