SMVEC
SCHOOL OF ARTS AND SCIENCE
(Approved by Government of Puducherry, Affiliated to Pondicherry University)
Madagadipet, Puducherry - 605107

DEPARTMENT OF COMPUTATIONAL STUDIES

M.Sc. COMPUTER SCIENCE

Academic Regulations 2023(R-2023)

Batch-2023-2025

Semester – III										
SL. No	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max Marks**		
				L	**T**	**P**		**CAM**	**ESM**	**Total**
Theory										
1	A23PCPT307	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	DSC	4	0	0	4	25	75	100
2	A23PCPT308	WEB TECHNOLOGY	DSC	4	0	0	4	25	75	100
3	A23PCPT309	BLOCK CHAIN TECHNOLOGY	DSC	4	0	0	4	25	75	100
4	A23PCPE307	DATA MINING	DSE	4	0	0	4	25	75	100
	A23PCPE308	CYBER SECURITY								
	A23PCPE309	DIGITAL MARKETING								
Practical										
5	A23PCPL305	WEB TECHNOLOGY LAB	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
6	A23PCPS303	ETHICAL HACKING	SEC	0	0	4	2	100	0	100
							20	250	350	600

Department	**Computational Studies**		Programme: **M.Sc Computer Science**					
Semester	**Third**		Course Category Code: **DSC**			*End Semester Exam Type: **TE**		
Course Code	**A23PCPT307**		Periods / Week			Credit	Maximum Marks	
			L	T	P	C	CAM	ESE	TM
Course Name	**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**		**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	Basic Knowledge in AI and ML								
Course Outcome	*After the completion of this course, the students will be able to:*								BT Mapping (Highest Level)
	CO1	Apply AI techniques to find solutions to a variety of engineering applications.							**K2**
	CO2	Understand the fundamental concepts involved in developing effective AI systems.							**K2**
	CO3	Interpret the various classification algorithms and its efficiency.							**K3**
	CO4	Demonstrate proficiency in applying scientific method to models of machine learning.							**K4**
	CO5	Investigate the issues involved in building solutions for real-world applications.							**K4**

UNIT-I	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**	**Periods: 12**	
Introduction to AI- Intelligent Agent -Search Methods and Knowledge representation- Use cases of AI –Role of Machine Learning- Machine Learning Tools & Package.			**CO1**
UNIT-II	**ARTIFICIAL INTELLIGENCE**	**Periods: 12**	
Plotting for exploratory data analysis (EDA) - Linear Algebra- Probability and Statistics- Dimensionality reduction and Visualization: PCA (principal component analysis) - (t-SNE) T-distributed Stochastic Neighborhood Embedding.			**CO2**
UNIT-III	**REAL WORLD PROBLEM**	**Periods: 12**	
Real world problem: Predict rating given product reviews on Amazon- Classification and Regression Models: K-Nearest Neighbors- Classification algorithms in various situations- Performance measurement of models- Naive Bayes- Logistic Regression- Linear Regression- Solving Optimization Problems.			**CO3**
UNIT-IV	**MACHINE LEARNING ALGORITHMS**	**Periods: 12**	
Support Vector Machines (SVM) - Decision Trees-Ensemble Models- Random Forest-Unsupervised Learning- K-Means Clustering – Ridge Regression.			**CO4**
UNIT-V	**CASE STUDIES**	**Periods: 12**	
Quora question Pair Similarity Problem- Personalized Cancer Diagnosis-Facebook Friend Recommendation using Graph Mining-Taxi demand prediction in Indian Cities-Stack overflow tag predictor- Microsoft Malware Detection.			**CO5**

Lecture Periods: 60	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. Stuart Russell and peter Norvig," **Artificial Intelligence a Modern Approach**", 4th Edition, Pearson Education, 2022.
2. Em Alpaydin,"**Introduction to Machine Learning**", MIT Press, 4th Edition, 2020.

Reference Books

1. **"Machine Learning Yearning" by Andrew Ng** (2018) - Provides practical advice and guidelines for machine learning practitioners.
2. **"Artificial Intelligence: A Guide for Thinking Humans" by Melanie Mitchell** (2019) - Explores the fundamentals of AI and its implications for society.
3. **"Grokking Deep Learning" by Andrew W. Trask** (2019) - Focuses on understanding deep learning concepts through practical examples.
4. **"Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron** (2019) - A practical guide to machine learning using popular Python libraries.
5. **"Artificial Intelligence Basics: A Non-Technical Introduction" by Tom Taulli** (2020) - Introduces AI concepts to non-technical readers.

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3
1	2	2	3	3	3	2	2	2
2	2	3	2	3	2	3	2	2
3	3	2	3	3	2	3	3	2
4	3	2	2	2	2	3	2	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **M.Sc COMPUTER SCIENCE**						
Semester	**Third**	Course Category Code: **DSC**			*End Semester Exam Type: **TE**			
Course Code	**A23PCPT308**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**WEB TECHNOLOGY**	**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	Basic knowledge about Web Technology							

Course Objectives

- Create and style static web pages using HTML and CSS.
- Explain the roles of clients and servers in web communication.
- Implement Object-Oriented Programming (OOP) concepts in PHP.
- Understand XML fundamentals and to create a XML documents.
- Implementing AJAX for creating dynamic web applications.

Course Outcome	*After the completion of this course, the students will be able to:*	BT Mapping (Highest Level)
	CO1 To Creating and styling static web pages using HTML and CSS.	**K2**
	CO2 To Explaining the roles of clients and servers in web communication.	**K3**
	CO3 To Implement Object-Oriented Programming (OOP) concepts in PHP.	**K3**
	CO4 To Understand XML fundamentals and to create a XML documents.	**K4**
	CO5 To Implement AJAX for creating dynamic web applications.	**K4**

UNIT-I	**Review of the Internet technologies**	**Periods: 12**
Introduction Web essentials: Web Vs Internet - Clients -Servers - Communication - Internet Address - Ports – Sockets - DNS - Firewall - Proxy - Internet Service Provider - Internet Services Protocols. Introduction to static web page creation using HTML (Tables, Frames, Forms) and Cascading Style Sheets.		**CO1**
UNIT-II	**Client-Side Scripting**	**Periods: 12**
Client-Side Scripting: Introduction - JavaScript – Data Types – Variable declarations - Language Constructs – JavaScript Functions. Windows Manipulation – Working with Forms and elements – Cookies.		**CO2**
UNIT-III	**Server-Side Scripting**	**Periods: 12**
Sever Side Scripting: Introduction – PHP Language Basics: Data Types – Variable declarations – Arrays – Functions – Language Constructs – OOP with PHP. Session Management – Authentication and Security – Reporting. Database manipulation with PHP and MYSQL.		**CO3**
UNIT-IV	**XML**	**Periods: 12**
XML: Introduction - XML Syntax - XML basics - XML Parser and Processors - XML DTD: Elements and Attributes – Types - XML Schema. SOAP - Creating Simple web services.		**CO4**
UNIT-V	**AJAX**	**Periods: 12**
AJAX: Introduction - creating and sending requests - XML in JavaScript and AJAX – server-side AJAX with PHP.		**CO5**

Lecture Periods: 60	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. "Internet and World Wide Web: How to Program" by Paul Deitel and Harvey Deitel 6th Edition, 2021.
2. "Eloquent JavaScript: A Modern Introduction to Programming" by Marijn Haverbeke 3rd Edition, 2018.
3. "PHP Objects, Patterns, and Practice" by Matt Zandstra 6th Edition, 2021.

Reference Books

1. Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross. 8th Edition 2020.
2. "Web Technology Reference Guide: A Comprehensive Handbook" Third Edition, 2003.

Web References

1. https://crk.umn.edu/academics/math-science-and-technology-department/information-technology-management/online
2. https://www.igi-global.com/journal/information-technology-management/1074

3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5787626/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	2	3	3	2	2	2	2	3
2	3	2	2	3	3	3	2	2	2
3	2	2	2	2	3	3	3	2	2
4	3	3	2	2	2	2	2	2	3
5	2	3	2	2	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**		Programme: **M.Sc. Computer Science**					
Semester	**Third**		Course Category Code: **DSC**			*End Semester Exam Type: **TE**		
Course Code	**A23PCPT309**		Periods / Week			Credit	Maximum Marks	
			L	T	P	C	CAM	ESE	TM
Course Name	**Block Chain Technology**		**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	Basic knowledge in Block chain technology								
Course Outcome	*After the completion of this course, the students will be able to:*							BT Mapping (Highest Level)	
	CO1	To know differences between the general computing system and the embedded system						**K2**	
	CO2	Ability to recognize the classification of embedded systems.						**K3**	
	CO3	Become aware of interrupts, hyper threading and software optimization.						**K3**	
	CO4	Design real time embedded systems using the concepts of RTOS.						**K4**	
	CO5	Students can able to enhance the future study in Embedded System.						**K4**	
UNIT-I	**Introduction**					**Periods: 12**			
Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Nakamoto's concept with Blockchain based crypto currency, Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc.									**CO1**
UNIT-II	**Basic Distributed Computing &amp Crypto primitives**					**Periods: 12**			
Atomic Broadcast, Consensus, Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, Collision resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems									**CO2**
UNIT-III	**Bitcoin basics**					**Periods: 12**			
Bitcoin block chain, Challenges and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use. Blockchain Network, Life of Blockchain application, Soft & Hard Fork, Private and Public block chain.									**CO3**
UNIT-IV	**Ethereum basics**					**Periods: 12**			
Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts, Writing smart contracts using Solidity & JavaScript									**CO4**
UNIT-V	**Privacy, Security issues in Blockchain**					**Periods: 12**			
Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Block chains: Sybil attacks, selfish mining, 51% attacks advent of algorand; Sharding based consensus algorithms to prevent these attacks. Case Studies: Block chain in Financial Service, Supply Chain Management and Government Services									**CO5**
Lecture Periods: 60	**Tutorial Periods: -**		**Practical Periods: -**			**Total Periods: 60**			

Text Books

1. Narayanan, Bonneau, Felten, Miller and Gold feder, "Bitcoin and Crypto currency Technologies – A Comprehensive Introduction", Princeton University Press, 2021.
2. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2019.
3. Imran Bashir, "Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained", Packt Publishing, 2021.

Reference Books

1. "Blockchain Applications: A Hands-On Approach" by Arshdeep Bahga and Vijay Madisetti, Edition: Second Edition (2020).
2. "Blockchain for Dummies" by Tiana Laurence, Edition: Updated Edition (2020).
3. Blockchain Basics: A Non-Technical Introduction in 25 Steps" by Daniel Drescher, Second Edition (2019),

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3
1	2	2	3	3	3	2	2	2
2	2	3	2	3	2	3	2	2
3	3	2	3	3	2	3	3	2
4	3	2	2	2	2	3	2	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**			Programme: **M.Sc Computer Science**				
Semester	**Third**			Course Category Code: **DSE**			*End Semester Exam Type: **TE**	
Course Code	**A23PCPE307**			Periods / Week			Credit	Maximum Marks
				L	T	P	C	CAM	ESE	TM
Course Name	**DATA MINING**			**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	**Basic Knowledge in Data Mining**									
Course Outcome	*After completion of the course, the students will be able to*							BT Mapping (Highest Level)		
	CO1	To learn about data mining Concepts						**K2**		
	CO2	To study the different data mining techniques						**K2**		
	CO3	To have knowledge in Data mining concepts						**K3**		
	CO4	To apply Data mining concepts in different fields						**K4**		
UNIT-I	**BASICS OF DATA MINING**						**Periods: 12**			
Basic Data Mining Tasks – Data Mining Versus Knowledge Discovery in Data Bases – Data Mining Issues – Data Mining Matrices – Social Implications of Data Mining – Data Mining from Data Base Perspective.										**CO1**
UNIT-II	**DATA MINING TECHNIQUES**						**Periods: 12**			
Data Mining Techniques – A Statistical Perspective on data mining – Similarity Measures –Decision Trees – Neural Networks – Genetic Algorithms.										**CO2**
UNIT-III	**DATA MINING CLASSIFICATION**						**Periods: 12**			
Classification: Introduction – Statistical – Based Algorithms – Distance Based Algorithms –Decision.										**CO3**
UNIT-IV	**DATA MINING CLUSTERING TREE BASED ALGORITHMS**						**Periods: 12**			
Clustering Tree – Based Algorithms – Neural Network Based Algorithms – Rule Based Algorithms – Combining Techniques: Introduction – Similarity and Distance Measures –Outliers – Hierarchical Algorithms. Partitioned Algorithms.										**CO4**
UNIT-V	**DATA MINING ASSOCIATION RULES**						**Periods: 12**			
Association Rules: Introduction - Large Item Sets – Basic Algorithms – Parallel & Distributed Algorithms – Comparing Approaches – Incremental Rules – Advanced Association Rules Techniques – Measuring the Quality of Rules.										**CO5**
Lecture Periods: 60		**Tutorial Periods: -**		**Practical Periods: -**			**Total Periods: 60**			

Text Books

1. "Introduction to Data Mining" by Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Third Edition (2018).
2. "Principles of Data Mining" by David J. Hand, Heikki Mannila, Padhraic Smyth, Third Edition (2021).

Web Reference

1. NPTEL & MOOC courses titled Data Mining
2. https://nptel.ac.in/courses/106105174/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **M.Sc (Computer Science)**						
Semester	**Third**	Course Category Code: **DSE**			*End Semester Exam Type: **TE**			
Course Code	**A23PCPE308**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**CYBER SECURITY**	**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	Basic knowledge about Cyber Security							

Course Objectives

- Develop an understanding of comprehensive cyber security policies.
- Understand the historical background and need for cyber forensics.
- Understand security challenges posed by mobile devices and credit card frauds in mobile and wireless computing.
- Understand the security risks and perils of social media marketing for organizations.
- Understand data privacy attacks, data linking, and profiling.

Course Outcome	*After the completion of this course, the students will be able to:*		BT Mapping (Highest Level)
	CO1	Define and explain basic concepts and layers of cyber security.	**K2**
	CO2	Explain the significance of the national cyber security policy.	**K3**
	CO3	Identify trends in mobility and analyze credit card frauds in mobile and wireless computing.	**K3**
	CO4	Propose measures to mitigate security risks in organizational settings.	**K4**
	CO5	Explain fundamental data privacy concepts and recognize data privacy attacks.	**K4**

UNIT-I	**INTRODUCTION TO CYBER SECURITY**	**Periods: 12**
Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.		**CO1**
UNIT-II	**CYBERSPACE AND THE LAW & CYBER FORENSICS**	**Periods: 12**
Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics		CO2
UNIT-III	**CYBERCRIME**	**Periods: 12**
Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.		**CO3**
UNIT-IV	**CYBER SECURITY**	**Periods: 12**
Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.		**CO4**
UNIT-V	**PRIVACY ISSUES**	**Periods: 12**
Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc		**CO5**

Lecture Periods: 60	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. "Computer Security: Principles and Practice" by William Stallings and Lawrie Brown, Fourth Edition (2018).

2. "Network Security Essentials: Applications and Standards" by William Stallings, Seventh Edition (2020).

Reference Books

1. "Cyber security: A Practical Guide to the Law of Cyber Risk" by David G. Ries, Daniel J. Solove Updated Edition (2019).
2. "Principles of Computer Security: CompTIA Security+ and Beyond" by Wm. Arthur Conklin, Gregory White, Chuck Cothren, Roger Davis, Dwayne Williams, Fourth Edition (2020).

Web References

1. https://www.ibm.com/topics/cybersecurity
2. https://www.geeksforgeeks.org/cyber-security-types-and-importance/
3. https://www.cisco.com/c/en/us/products/security/what-is-cybersecurity.html
4. https://www.coursera.org/articles/what-is-cyber-security
5. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-cyber security

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	2	3	3	2	2	2	2	3
2	3	2	2	3	3	3	2	2	2
3	2	2	2	2	3	3	3	2	2
4	3	3	2	2	2	2	2	2	3
5	2	3	2	2	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **M.Sc (Computer Science)**						
Semester	**Third**	Course Category Code: **DSE**			*End Semester Exam Type: **TE**			
Course Code	**A23PCPE309**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**DIGITAL MARKETING**	**4**	**0**	**0**	**4**	**25**	**75**	**100**

Prerequisite	Basic knowledge about Digital Marketing
Course Objectives	• Understand the landscape of internet users and how digital marketing targets them. • Explore YouTube advertising strategies and techniques. • Learn Twitter marketing strategies, including context strategy, Twitter ads, analytics, and tools. • Understand the concept of search engines and the fundamentals of SEO. • Identify key metrics and learn how to make web analytics actionable.

Course Outcome	*After the completion of this course, the students will be able to:*		BT Mapping (Highest Level)
	CO1	Identify and develop essential skills required in digital marketing.	**K2**
	CO2	Explain the concept and types of display advertising.	**K3**
	CO3	Develop strategies for successful social media marketing.	**K3**
	CO4	Implement on-page and off-page optimization techniques.	**K4**
	CO5	Understand different types of tracking codes and their application in mobile analytics.	**K4**

UNIT-I	**DIGITAL MARKETING**	**Periods: 12**
Introduction to Digital Marketing: Internet Users – Digital Marketing Strategies - Skills Required in Digital Marketing - Digital Marketing Plan. Display Advertising: Introduction - Concept of Display Advertising - Types of Display Ads - Buying Models - Display Plan - Targeting - Make a Good Ad.		**CO1**
UNIT-II	**ADVANCED DISPLAY ADVERTISING**	**Periods: 12**
Programmatic Digital Advertising - Analytics Tools - YouTube Advertising. Search Engine Advertising: Introduction - Pay for Search Advertising - Understanding Ad Placement - Understanding Ad Ranks. Social Media Marketing: Introduction – To build a Successful Strategy.		**CO2**
UNIT-III	**FACEBOOK MARKETING**	**Periods: 12**
Introduction - Facebook for Business- Anatomy of an Ad Campaign - Adverts - Other Marketing Tools - Other Essentials. Twitter Marketing: Introduction - Getting Started with Twitter - Building a Context Strategy - Twitter Usage - Twitter Ads – Twitter Analytics - Twitter Tools and Tips for Marketers. Instagram and Snap chat: Introduction- Instagram- snap chat		**CO3**
UNIT-IV	**SEARCH ENGINE OPTIMIZATION**	**Periods: 12**
Introduction - Search Engine - Concept of Search Engine Optimisation- SEO Phases - On page optimization- Off page Optimization- Social Media Reach - Maintenance.		**CO4**
UNIT-V	**Web Analytics**	**Periods: 12**
Introduction - Data Collection - Key Metrics - Marketing Web Analytics Actionable - Types of Tracking codes - Mobile Analytics.		**CO5**

Lecture Periods: 60	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1.Gupta, S. (2017). Digital Marketing, (1st Ed.). Mc-Graw Hill, New Delhi.

2.Deiss, R., & Henneberry, R. (2020). Digital Marketing for Dummies, (2nd Ed.). John Wiley& Sons, Inc.

Reference Books

1.Dodson, I. (2018). The Art of Digital Marketing. Wiley, New Jersey, USA.

2.Kamat, N.C., & Kamat, N.C. (2018). Digital Social Media Marketing, Himalaya Publishing House Pvt. Ltd.

Web References

1. https://www.coursera.org/articles/digital-marketing
2. https://www.forbes.com/advisor/business/what-is-digital-marketing/

3. https://mailchimp.com/marketing-glossary/digital-marketing/
4. https://digitalmarketinginstitute.com/blog/what-is-digital-marketing
5. https://www.salesforce.com/marketing/what-is-digital-marketing/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	2	3	3	2	2	2	2	3
2	3	2	2	3	3	3	2	2	2
3	2	2	2	2	3	3	3	2	2
4	3	3	2	2	2	2	2	2	3
5	2	3	2	2	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **M.Sc COMPUTER SCIENCE**						
Semester	**Third**	Course Category Code: **DSC**			*End Semester Exam Type: **LE**			
Course Code	**A23PCPL305**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	IM	ESE	TM
Course Name	**WEB TECHNOLOGY LAB**	**0**	**0**	**4**	**2**	**50**	**50**	**100**

Prerequisite	Basic Knowledge in HTML, JavaScript , CSS and PHP
Course Objectives	• Create and style static web pages using HTML and CSS. • Explain the roles of clients and servers in web communication. • Implement Object-Oriented Programming (OOP) concepts in PHP. • Understand XML fundamentals and to create a XML documents. • Implementing AJAX for creating dynamic web applications.

Course Outcome	*After completion of the course, the students will be able to*	BT Mapping (Highest Level)
	CO1 To Creating and styling static web pages using HTML and CSS.	**K3**
	CO2 To Explaining the roles of clients and servers in web communication.	**K3**
	CO3 To Implement Object-Oriented Programming (OOP) concepts in PHP.	**K3**
	CO4 To Understand XML fundamentals and to create a XML documents.	**K4**
	CO5 To Implement AJAX for creating dynamic web applications.	**K4**

List of Experiment

1. To create a simple webpage using HTML that includes all tags.
2. Applying Style to an HTML Page Using CSS.
3. Client-Side Programming:
    a. Java script for Displaying and Comparing Date
    b. Form Validation including text field, radio buttons, check boxes, list box and other controls.
4. Online Applications using PHP.
5. Online application with data access.
6. To analyze the performance of various configurations and protocols in LAN.
    a. Establishing a LAN.
    b. Connecting two LANs using multi-router topology with static routes.
7. To analyze the performance of RIP and OSPF redistribution.
8. To analyze the network security for improving the security of the network.
9. To Control Traffic Flow in a network.
10. To configure a firewall and analyze it for a network.

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods: 30**	**Total Periods: 30**

Text Books

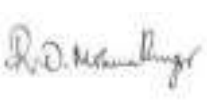
1. "Web Technologies: A Computer Science Perspective" by Jeffrey C. Jackson, Third Edition (2017).
2. "Web Development and Design Foundations with HTML5" by Terry Felke-Morris, Ninth Edition (2020).

Reference Books

1. "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Niederst Robbins, Fifth Edition (2018).
2. "Node.js Web Development: Server-side Development with Node 10 made easy" by David Herron, Third Edition (2018).

Web References

1. https://crk.umn.edu/academics/math-science-and-technology-department/information-technology-management/online
2. https://www.igi-global.com/journal/information-technology-management/1074.



*LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	2	3	3	2	2	2	2
2	2	2	2	3	2	3	2	2
3	2	2	2	2	2	3	3	2
4	3	3	2	2	2	2	2	2
5	3	2	2	2	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Internal Marks			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	50	100
Marks	30	10	10		

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**			Programme: **M.Sc. Computer Science**				
Semester	**Third**			Course Category Code: **SEC**			*End Semester Exam Type: **TE**	
Course Code	**A23PCPS303**			Periods / Week			Credit	Maximum Marks
				L	T	P	C	CAM	ESE	TM
Course Name	**Ethical Hacking**			**0**	**0**	**4**	**2**	**100**	**-**	**100**
Prerequisite	**Basic knowledge in Ethical Hacking**									
Course Outcome	*After completion of the course, the students will be able to*							BT Mapping (Highest Level)		
	CO1	Ability to understand the processes involved in ethical hacking.						**K2**		
	CO2	Enhance the skill in energy saving practices in their use of hardware.						**K2**		
	CO3	To Understand the Ethical Hacking Process.						**K3**		
	CO4	To Get familiarized with Tools and Techniques of Ethical Hacking.						**K4**		

UNIT-I	**Introduction to Ethical Hacking**	**Periods:6**	
Information security overview – skills of an ethical hacker – Hacking concepts and phases - Types of attacks – Information Security threats, attack vectors, and controls – Information Assurance (IA) – Information Security Laws and Standards – Security Policies types, HR/legal implications – Physical Security – Threat Modelling –Enterprise Information Security Architecture (EISA) – Network Security Zoning.			**CO1**
UNIT-II	**Foot Printing & Reconnaissance**	**Periods: 6**	
Foot printing concepts, threats, attack vectors and controls, Foot printing through Search Engines, Foot Printing through Social Networking sites, Website Foot printing, Competitive Intelligence, WHOIS Foot printing, Foot Printing tools. Scanning Networks: Scanning Methodology, techniques, and countermeasures -Techniques for IDS evasion, scanning, HTTP tunneling, and IP spoofing - Drawing network diagrams—latest network discovery and mapping tools, network discovery tools for mobile - Proxy chaining—latest proxy tools, proxy tools for mobile Enumeration: Protocols: NetBIOS, SNMP, LDAP, NTP, SMTP, DNS – Countermeasures – Techniques.			**CO2**
UNIT-III	**System Hacking**	**Periods: 6**	
Cracking passwords, escalating privileges, executing applications, hiding files and covering tracks – Steganography application and classification, tools, methods/attacks on Steganography, Steganography detection tools. Practical: Foot Printing & Reconnaissance, Scanning Networks, Enumeration, System Hacking.			**CO3**
UNIT-IV	**Malware Threats**	**Periods: 6**	
Introduction to malware – Trojans attacks, how to infect a system, crypters, how to deploy, latest types, analysis, countermeasures - Viruses—stages, types, latest virus maker, analysis, countermeasures - Worms—types, makers, analysis, countermeasures - Malware analysis - Antivirus tools - Penetration testing.			**CO4**
UNIT-V	**Sniffing and Attacks**	**Periods: 6**	
MAC, DHCP, and spoofing - Poisoning: ARP and DNS – Tools Social Engineering: Concepts, techniques, impersonation, identity theft, and Counter measures - Phases of an attack - Common targets of an attack – Impersonation scenario - Computer based, mobile based, social networking based Denial of Service: Concepts, case study, tools, attack techniques, and Countermeasures Botnet - Scanning methods for vulnerable machines - Detection Techniques and tools. Session Hijacking: Concepts, case study, tools, attack techniques, and Countermeasures - Five stages of a web malware attack - Application level session hijacking - Network level session hijacking - TCP/IP Hijacking.			**CO5**

Lecture Periods: 30	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 30**

Text Books

1. "The Hacker Playbook 3: Practical Guide to Penetration Testing" by Peter Kim in 2020
2. "CEH Certified Ethical Hacker All-in-One Exam Guide, Fourth Edition" by Matt Walker in 2020.
3. "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto (Third Edition, in 2021).

Reference Books

1. "Penetration Testing: A Hands-On Introduction to Hacking" by Georgia Weidman in 2020
2. "Metasploit: The Penetration Tester's Guide" by David Kennedy, Jim O'Gorman, Devon Kearns, and Mati Aharoni, Third Edition, in 2020.

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)				Total Marks
	Exam	Report	Assignment*	Attendance	
Marks	70	10	10	10	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

DEPARTMENT OF COMPUTATIONAL STUDIES

M.Sc. COMPUTER SCIENCE

Academic Regulations 2023(R-2023)

Batch-2023-2025

Semester – IV										
SL.No	Course Code	Course Title	Category	Periods			Credits	Max Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A23PCPT410	ADVANCED SOFTWARE ENGINEERING	DSC	4	0	0	4	25	75	100
2	A23PCPT411	BIG DATA ANALYTICS	DSC	4	0	0	4	25	75	100
Practical										
3	A23PCPP401	PROJECT WORK AND VIVA VIOCE	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
4	A23PCPS404	RESEARCH METHODOLOGY	SEC	0	0	4	2	100	0	100
							12	200	200	400

Department	**Computational Studies**		Programme: **M.Sc Computer Science**					
Semester	**Four**		Course Category Code: **DSC**			*End Semester Exam Type: **TE**		
Course Code	**A23PCPT410**		Periods / Week			Credit	Maximum Marks	
			L	T	P	C	CAM	ESE	TM
Course Name	**ADVANCED SOFTWARE ENGINEERING**		**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	**Basic knowledge in Advance Software Engineering**								
Course Outcome	*After completion of the course, the students will be able to*							BT Mapping (Highest Level)	
	CO1	Learn about the various models and methods.						**K2**	
	CO2	Develop and implement the software life cycle models.						**K2**	
	CO3	Design the software models.						**K3**	
	CO4	Analyze the coding techniques						**K4**	

UNIT-I	**SOFTWARE ENGINEERING PROCESS**	**Periods: 12**
Software Engineering Process Paradigms Project management Process and Project Metrics Software estimation Empirical estimation models planning Risk analysis Software project scheduling and Tracking.		**CO1**
UNIT-II	**SYSTEM PROCESS AND PRODUCT HIERARCHY**	**Periods: 12**
System, Process and Product Engineering Hierarchies Requirement Engineering and its phases, Building the Analysis Models: Concepts, Data Flow Model, Control Flow Model, State Charts and Transition Models, Quality Function Deployment, Language and Tools, Requirements Validation Metrics.		**CO2**
UNIT-III	**SOFTWARE DESIGN CONCEPT**	**Periods: 12**
Software Design Concepts and Principles, Data Design, Software Architectural Styles-Analysis of Architectural Designs Architectural Design Metrics, Design Structure Quality Index Estimation, User interface design models and process -Interface Design Activities, Component Level Design and Notations, Component Level Design Metrics.		**CO3**
UNIT-IV	**SOFTWARE TESTING**	**Periods: 12**
Principles of Software Testing White-Box Testing Techniques and its Variants, Black- Box Testing Techniques and its Variants, Integration, Validation and System Testing, Debugging.		**CO4**
UNIT-V	**SOFTWARE QUALITY ASSURANCE**	**Periods: 12**
Software Quality Assurance Quality Metrics and Models, Software Reliability Theory-Software Maintenance Software Configuration Management - Reverse Engineering and Re-engineering, Introduction to CASE Tools and Case Studies.		**CO5**

Lecture Periods: 60	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. "Software Engineering: A Practitioner's Approach" by Roger S. Pressman and Bruce R. Maxim, Ninth Edition (2021).
2. "Software Engineering: Modern Approaches" by Eric J. Braude and Michael E. Bernstein, Second Edition (2020).

Reference Books

1. "Advanced Software Engineering: Expanding the Frontiers of Software Technology" by Shojiro Nishio, Tetsuo Tamai, Haruhiko Kaiya, First Edition (2021).
2. "Software Architecture in Practice" by Len Bass, Paul Clements, Rick Kazman, Third Edition (2012).

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**			Programme: **M.Sc Computer Science**				
Semester	**Four**			Course Category Code: **DSE**		*End Semester Exam Type: **TE**		
Course Code	**A23PCPT411**			Periods / Week			Credit	Maximum Marks
				L	T	P	C	CAM	ESE	TM
Course Name	**BIG DATA ANALYTICS**			**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	**Basic Knowledge in Big Data**									
Course Outcome	*After completion of the course, the students will be able to*							BT Mapping (Highest Level)		
	CO1	Recognize big data projects.						**K2**		
	CO2	Implement big data technology and tools						**K2**		
	CO3	Demonstrate MapReduce and Hadoop and its ecosystem						**K3**		
	CO4	Implement a sample system using Hadoop.						**K4**		

UNIT-I	**INTRODUCTION TO BIG DATA**	**Periods: 12**	
Introduction – distributed file system – Big Data and its Vs importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.			**CO1**
UNIT-II	**INTRODUCTION TO HADOOP**	**Periods: 12**	
Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce – Data Serialization.			**CO2**
UNIT-III	**HADOOP ARCHITECTURE**	**Periods: 12**	
Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., Name Node, Secondary NameNode, and DataNode,Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup –SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.			**CO3**
UNIT-IV	**HADOOP ECOSYSTEM AND YARN**	**Periods: 12**	
Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features Name Node- High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.			**CO4**
UNIT-V	**HIVE AND HIVEQL,HBASE**	**Periods: 12**	
Hive Architecture and Installation, Comparison with Traditional Database, HiveQL – Querying- Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase concepts Advanced-Usage, Schema Design, Advance Indexing.			**CO5**

Lecture Periods: 60	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. "Hadoop: The Definitive Guide" by Tom White, Fifth Edition (2021).
2. "Big Data Analytics: From Data to Insights" by Michael Minelli, Michele Chambers, and Ambiga Dhiraj, Second Edition (2018).

Reference Books

1 "Big Data Analytics: Tools and Technology for Effective Planning" by Arvind Sathi, First Edition (2018).
2. "Big Data for Dummies" by Judith S. Hurwitz, Alan Nugent, Fern Halper, and Marcia Kaufman, Third Edition (2016).

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: M**.Sc Computer Science**						
Semester	**Fourth**	Course Category Code: **DSC**			*End Semester Exam Type: **LE**			
Course Code	**A23PCPP401**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Project work and Viva-voce**	**0**	**0**	**4**	**2**	**50**	**50**	**100**

Domains:

- Social Network Analysis
- Business Analysis
- E-Commerce Analysis
- Banking Analysis
- Digital Marketing Analysis

SI.NO	Description			Weightage
1	Continuous Assessment Marks			
a.	Review 1	Review Committee	5	10
		Guide	5	
b.	Review 2	Review Committee	5	10
		Guide	5	
c.	Review 3	Review Committee	15	30
		Guide	15	
Total CAM				50
2	End Semester Marks			
a.	Evaluation of Mini Project report	Internal Examiner	20	40
		External Examiner	20	
b.	Outcome	Publication of Papers/ Conference Presentations/ Patents/ Prototypes etc.	10	10
			Total ESM	50
			Total Marks	100

Department	**Computational Studies**			Programme: **M.Sc. Computer Science**				
Semester	**Fourth**			Course Category Code: **SEC**			*End Semester Exam Type: **TE**	
Course Code	**A23PCPS404**			Periods / Week			Credit	Maximum Marks
				L	T	P	C	CAM	ESE	TM
Course Name	**RESEARCH METHODOLOGY**			**0**	**0**	**4-**	**2**	**100**	**-**	**100**
Prerequisite	**Basic knowledge in Research Methodology**									
Course Outcome	*After completion of the course, the students will be able to*							BT Mapping (Highest Level)		
	CO1	Students are able to demonstrate knowledge of research processes (reading, evaluating, and developing);						**K2**		
	CO2	Students are able to perform literature reviews using print and online databases;						**K2**		
	CO3	Students are able to identify, explain, compare, and prepare the key elements of a research proposal/report;						**K3**		
	CO4	Students are able to compare and contrast quantitative and qualitative research						**K4**		

UNIT-I	**FOUNDATIONS OF RESEARCH**	**Periods: 12**
Meaning – Objectives – Motivation - Utility. Concept of theory – empiricism - deductive and inductive theory. Characteristics of scientific method –Understanding the language of research –Concept – Construct – Definition – Variable – Research Process.		**CO1**
UNIT-II	**PROBLEM IDENTIFICATION & FORMULATION**	**Periods: 12**
Research Question–Investigation Question –Measurement Issues –Hypothesis –Qualities of a good Hypothesis – Null Hypothesis & Alternative Hypothesis. Hypothesis Testing –Logic & Importance.		
UNIT-III	**RESEARCH DESIGN**	**Periods: 12**
Concept and Importance in Research –Features of a good research design –Exploratory Research Design – concept, types and uses, Descriptive Research Designs –concept, types and uses.		**CO3**
UNIT-IV	**QUALITATIVE AND QUANTITATIVE RESEARCH**	**Periods: 12**
Qualitative research –Quantitative research –Concept of measurement, causality, generalization, replication. Merging the two approaches.		**CO4**
UNIT-V	**MEASUREMENT**	**Periods: 12**
Concept of measurement–what is measured? Problems in measurement in research –Validity and Reliability. Levels of measurement –Nominal, Ordinal, Interval, Ratio.		**CO5**

Lecture Periods: 60	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches by John W. Creswell and J. David Creswell (2021).
2. Research Methodology: A Step-by-Step Guide for Beginners by Ranjit Kumar (2022).
3. Research Methods in Education by Louis Cohen, Lawrence Manion, and Keith Morrison (2020).
4. Qualitative Inquiry and Research Design: Choosing Among Five Approaches by John W. Creswell and Cheryl N. Poth (2023).

5. Social Research Methods: Qualitative and Quantitative Approaches by W. Lawrence Neuman (2021).

Reference Books

1. Introduction to Research Methods in Education by Keith F. Punch (2020).
2. Doing Quantitative Research in Education with SPSS by Daniel Muijs (2022).
3. Research Methods for Business: A Skill Building Approach by Uma Sekaran and Roger Bougie (2023).
4. Research Design and Methods: A Process Approach by Kenneth S. Bordens and Bruce B. Abbott (2020).
5. Qualitative Research: A Guide to Design and Implementation by Sharan B. Merriam and Elizabeth J. Tisdell (2021).

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)				Total Marks
	Exam	Report	Assignment*	Attendance	
Marks	70	10	10	10	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus