Government College of Engineering,
Chhatrapati Sambhajinagar

(Formerly Government College of Engineering, Aurangabad)
(An Autonomous Institute of Government of Maharashtra)
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Curriculum for Master in Computer Applications
(NEP Compliant)

(With Effect from Academic Year 2023-24)

Master of Computer Application Department
Syllabus for MCA programme (NEP Compliant)
wef academic year 2023-2024

Vision of the Institute -

- In pursuit of global competitiveness, the institute is committed to excel in engineering education and research with concern for environment and society.

Mission of the Institute -

- Provide conducive environment for academic excellence in engineering education.
- Enhance research and development along with promotion to sponsored projects and industrial consultancy.
- Foster development of students by creating awareness for needs of society, sustainable development and human values.

Vision of the Master in Computer Applications Department -

- To Provide cutting-edge computer science education through state-of-the-art teaching and research environment.

Mission of the Master in Computer Applications Department -

- To provide excellent academic platform to graduate students to make them proficient in computer science equipped with applications.

Program Educational Outcomes (PEO) - The graduates will be able to:

- Establish themselves as successful IT professional and continue further to grow as a researcher.
- Capable leaders in software development.
- Pioneers in entrepreneurship, innovations with social awareness.

Program Specific Outcomes (PSO) -

- To Analyse, Design, Test, implement and document Software components, processes for finding solutions with specific application development using suitable models.
- To solve real world problems specified with constraints by using modern software tools, resources and techniques.
- To apply contextual knowledge to assess social, legal and cultural issues to the professional practice.

Program Outcomes (PO) -

1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design systems components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, social and environmental consideration. To use modern engineering IT tools to solve and model electrical engineering problems.
4. Conduct investigations of complex problems: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including predictions and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibility relevant to the professional engineering practice.

7. Environment and sustainability: Understands the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual and as a member or leader in diverse teams, and multidisciplinary settings.

10. Communications: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentations, make effective presentations and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects multidisciplinary environments.

12. Life-long learning: Recognize the need for and have preparation and ability to engage in independent and life-long learning in the broadest context of technological changes.

General Course Structure & Theme -

A. Definition of Credit-

1 Hr. Lecture (L) per week	1 Credit
2 Hours Practical (P) per week	2 Credit

B. Range of Credits-

- The total number of credits proposed for the two-year full time MCA is kept as 88.

C. Semester wise Credit Distribution Structure for Two-Year Full-Time PG Program in MCA-

Semester		I	II	III	IV	Total Credits
Programme Core Course (PCC)	Program Courses	17	14	10		41
Programme Elective Course (PEC)			4	8		12
Open Elective (OE) Other than a particular program	Multidisciplinary Courses		3			3
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	5				5
Ability Enhancement Course (AEC)	Humanities, Social Science and Management (HSSM)		1	4		5
Entrepreneurship/Economics/ Management Courses						
Research Methodology	Experiential Learning Courses					
Project/INT				2	20	22
Co-curricular Courses (CC)	Liberal Learning Courses					
Total Credits (Major)		**22**	**22**	**24**	**20**	**88**

D. Category-wise Courses-

1. Liberal Learning Courses (CO-CURRICULAR COURSES (CC))

Sr.No.	Category	Course Title	Semester	Hours per week			Total Credits
				Lecture	Tutorial	Practical	
1	CCC	INCCC5001-Lab: YOGA/ Club	1			2	Audit Course
Total Credits							-

2. Vocational And Skill Enhancement Course (VSEC)

Sr.No.	Category	Course Title	Semester	Hours per week			Total Credits
				Lecture	Tutorial	Practical	
1	VSE	MCVSE1004-Web Programming and scripting	1	4			4
2	VSE	MCVSE1009-Lab: Web Programming and scripting	1			2	1
Total Credits							5

3. Multidisciplinary Courses (OEC))

Sr.No.	Category	Course Title	Semester	Hours per week			Total Credits
				Lecture	Tutorial	Practical	
1	OEC	CSOEC5002-Professional Ethics and Cyber law ECOEC5006-IOT for Smart Systems AMOEC6001-Indian Constitutions	2	3			3
Total Credits							3

4. Humanities & Social Sciences Courses (HSSM)

Sr.No.	Category	Course Title	Semester	Hours per week			Total Credits
				Lecture	Tutorial	Practical	
1	AEC	MCAEC1019-Lab: Technical Communication skills	2			2	1
2	HSSM (AEC)	MCAEC2012-Lab: Seminar	3			2	1
3	HSSM (EEM)	MCEEM2003-Enterprise Resource Planning	3	3			3
Total Credits							5

5. Experiential Learning Courses - Project, Internship/On Job Training (PRJ/INT)

Sr.No.	Category	Course Title	Semester	Hours per week			Total Credits
				Lecture	Tutorial	Practical	
1	PRJ	MCPRJ2013-Minor Project	3			4	2
2	INT	MCINT2014-Internship/ On Job Training	4			40	20
Total Credits							22

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Master of Computer Application Department
Structure for First Year MCA programme wef academic year 2023-2024

Sr.No	Category	Course Code	Course Title	Lectures	Practicals	Contact Hrs / Week	Course Credits	Examination Scheme			
								CT	TA/TW	ESE	TOTAL
Theory Courses											
1	PCC	MCPCC1001	Data Structures	3		3	3	20	20	60	100
2	PCC	MCPCC1002	Computer Programming	3		3	3	20	20	60	100
3	PCC	MCPCC1003	Data Base Management System	3		3	3	20	20	60	100
4	VSE	MCVSE1004	Web Programming and scripting	4		4	4	20	20	60	100
5	PCC	MCPCC1005	Software Engineering	3		3	3	20	20	60	100
Practical Courses											
6	PCC	MCPCC1006	Lab: Data Structures		2	2	1		25	25	50
7	PCC	MCPCC1007	Lab: Computer Programming		4	4	2		50	25	75
8	PCC	MCPCC1008	Lab: Data Base Management System		4	4	2		50	25	75
9	VSE	MCVSE1009	Lab: Web Programming and scripting		2	2	1		25	25	50
10	CCC	INCCC5001	Lab: YOGA/ Club		2	2			-	-	-
Total				16	14	30	22	100	250	400	750

Abbreviations-

CT-Class Test   TA/TW-Teachers Assessment / Term Work   ESE-End Semester Examination

Course **INCCC5001 Lab: YOGA/CLUB** is offered by Mechanical Engineering Department.

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

Master of Computer Application Department
Structure for First Year MCA programme wef academic year 2023-2024

Sr.No	Category	Course Code	Course Title	Lectures	Practicals	Contact Hrs / Week	Course Credits	CT	TA/TW	ESE	TOTAL
					Semester-II						
					Theory Courses						
1	PCC	MCPCC1010	Object Oriented Programming with Java	3		3	3	20	20	60	100
2	PCC	MCPCC1011	Python Programming	3		3	3	20	20	60	100
3	PCC	MCPCC1012	Information Security	3		3	3	20	20	60	100
4	PEC	MCPEC1013 to MCPEC1015	Elective-I	4		4	4	20	20	60	100
5	OEC	-	Open Elective-I	3		3	3	20	20	60	100
					Practical Courses						
6	PCC	MCPCC1016	Lab: Object Oriented Programming with Java		4	4	2		50	25	75
7	PCC	MCPCC1017	Lab: Python Programming		4	4	2		50	25	75
8	PCC	MCPCC1018	Lab: Information Security		2	2	1		25	25	50
9	HSSM/ AEC	MCAEC1019	Lab: Technical Communication skills		2	2	1		25	25	50
		Total		16	12	28	22	100	250	400	750

Elective-I		Open Elective-I	
MCPEC1013	Data Science	CSOEC5002	Professional Ethics and Cyber law
MCPEC1014	Soft Computing	ECOEC5006	IOT for Smart Systems
MCPEC1015	Data Mining	AMOEC6001	Indian Constitutions

Abbreviations-

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Course **CSOEC5002 Professional Ethics and Cyber law** is offered by Computer Engineering Department
Course **ECOEC5006 IOT for Smart Systems** is offered by Electronics Engineering Department
Course **AMOEC6001 Indian Constitutions** is offered by Applied Mechanics Department

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

Master of Computer Application Department
Structure for Second Year MCA programme wef academic year 2024-2025

									Semester-III			
Sr.No	Category	Course Code	Course Title	Lectures	Practicals	Contact Hrs / Week	Course Credits	Examination Scheme				
								CT	TA/TW	ESE	TOTAL	
Theory Courses												
1	PCC	MCPCC2001	Advance Java	3	-	3	3	20	20	60	100	
2	PCC	MCPCC2002	ASP.Net and C#	4	-	4	4	20	20	60	100	
3	HSSM /EEM	MCEEM2003	Enterprise Resource Planning	3	-	3	3	20	20	60	100	
4	PEC	MCPEC2004 to MCPEC2006	Elective-II	4	-	4	4	20	20	60	100	
5	PEC	MCPEC2007 to MCPEC2009	Elective-III	4	-	4	4	20	20	60	100	
Practical Courses												
6	PCC	MCPCC2010	Lab: Advance Java	-	4	4	2	-	50	25	75	
7	PCC	MCPCC2011	Lab: ASP.Net and C#	-	2	2	1	-	25	25	50	
8	HSSM (AEC)	MCAEC2012	Seminar	-	2	2	1	-	50	-	50	
9	PRJ	MCPRJ2013	Minor Project	-	4	4	2	-	50	25	75	
Total				18	12	30	24	100	250	400	750	

Elective-II		Elective-III	
MCPEC2004	Software Quality Assurance	MCPEC2007	Mobile Technology
MCPEC2005	Machine Learning	MCPEC2008	Block Chain
MCPEC2006	Big Data Analytics	MCPEC2009	Cloud Computing

Abbreviations-

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Semester-IV											
Sr.No	Category	Course Code	Course Title	Lectures	Practicals	Contact Hrs / Week	Course Credits	Examination Scheme			
								CT	TA/TW	ESE	TOTAL
Theory Courses											
1	INT	MCINT2014	Internship/ On Job Training		40	40	20		100	100	200
Total				-	40	40	20		100	100	200

Abbreviations-

CT-Class Test   TA/TW-Teachers Assessment / Term Work   ESE-End Semester Examination

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPCC1001: Data Structures		
Teaching Scheme	**Examination Scheme**	
Lectures : 03 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 03	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand basic data structures and asymptotic notations.

CO2: Apply data structures to algorithmically design efficient computer programs that will cope with the complexity of actual applications.

CO3: Design and implementation of data structures and algorithms.

CO4: Analyze worst-case running times of algorithms using asymptotic analysis.

CO5: Develop algorithms for sorting and searching problems.

Course Contents

Unit No	Detailed Contents

1 **Data structures:**

Data structure operations, abstract data types (ADT), Arrays, Structures, pointers, dynamic memory management, efficiency of algorithm, algorithm analysis, asymptotic notations for complexity of algorithms – Big-Oh, Theta, Omega.

Stacks: Primitive operations in stack, array representation of stacks, linked representation of stacks, Application of stacks, example - infix, postfix and prefix.

2 **Queues:**

Linked representation of queues, queue as ADT, circular queues, deques, priority queues, applications of queues.

Linked lists: Linked lists, representation of linked list in memory, traversing a linked list, searching a linked list, insertion, deletion, header linked list, circularly linked list, doubly linked lists, buddy systems.

3 **Trees:**

Binary trees, representing binary tree in memory, traversing binary trees, header nodes, threaded binary trees, binary search trees, searching and inserting in binary search tree, deleting in a binary search tree, balanced binary trees, AVL search trees, B trees, applications of trees.

4 **Sorting:**

Bubble sort, merge sort, quick sort, radix sort, selection sort, heap sort, searching.

5 **Graphs:**

Graph theory terminology, sequential representation of graphs; adjacency matrix, path matrix, Warshall's algorithm; shortest path, linked representation of graph, operations on graph, topological sorting, and spanning trees: Prim's and Kruskal's algorithm.

Searching and Hashing algorithms: Sequential Search, Ordered lists, binary search, Hash tables, Hash functions, Some examples of hash functions, Collision.

Approved in XXVIth Academic Council
Dated: 27th April 2023

Text Books

1. Data Structures using C and C++, Aaron M. Tanenbaum, Pearson Education India, ISBN: 9788131702291
2. Fundamentals of Data Structures in C, E. Horowitz, S. Sahni, S. Anderson-freed, Second Edition, University Press, ISBN 978-81-7371-605-8

Refernce Books

1. An introduction to data structures with Applications, Jean-Paul Tremblay, Paul. G. Soresan, Tata Mc-Graw Hill International Editions, 2nd edition 1984, ISBN-0-07-462471-7
2. Data Structures and Algorithms, Aho, Ullman & Hopcroft, Pearson Education India, ISBN: 9788177588262
3. Purely Functional Data Structures, Chris Okasaki, Cambridge University Press; ISBN: 9780521663502

E Books/ Online learning material

1. https://nptel.ac.in/courses/106/102/106102064/

Mapping of COs and POs

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	1												1	
CO 2	1	2	2	1									1	2	
CO 3	1	2	2	1									1	2	
CO 4	1	3	3	1	2				2				1	2	
CO 5	1	3	2	1									1	2	

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	8	5	2	-
ISE II* 20 Marks	-	5	5	5	5
ESE Assessment 60 Marks	6	18	12	12	12

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5		18
K2	Understand	5	5	12
K3	Apply	5	5	12
K4	Analyze	5	5	12
K5	Evaluate	-	5	6
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPCC1002 Computer Programming		
Teaching Scheme	**Examination Scheme**	
Lectures : 03 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 03	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understanding of computers, the concept of algorithm and algorithmic thinking.

CO2: Analyse the problem and select the most appropriate method to solve it.

CO3: Analyse and compare various programming constructs and apply the right one for the task.

CO4: Design the problem solution using modularity, repetition and advanced features of C programming language.

CO5: Evaluate the code, document, test, and implement a well structured, robust computer program.

Course Contents

Unit No	Detailed Contents
1	**Introduction to C Language:** The C character set, Identifiers and keywords, Data types, Variables and Constants, Statements, Symbolic constants, Operators and expressions, Type conversion, Data input and output.
2	**Control statement:** Branching - if else statement, Looping, Nested control structure, Switch statement, Break statement, Continue statement, GOTO statement. **Arrays:** Defining an array, one and two dimensional arrays, Strings: One dimensional character array, array of strings.
3	**Functions:** Overview, function prototypes, function definition, passing arguments to a function, scope of variable names, recursion. **Program structure:** Storage classes, automatic variables, external variables, static variables, multi-file program. **Arrays:** Passing array to functions, String manipulation.
4	**Pointers:** Fundamentals, operation on pointers, accessing arrays through pointers, dynamic memory allocation, pointers and strings, pointers to function. **Structures and unions:** Defining a structure, operations on structures, passing structures as function arguments. Union.
5	**File Manipulation:** Opening and closing a data file, reading and writing a data file, processing a data file, unformatted data file, concept of binary file. **Low level programming:** Register variable, bitwise operations, bit fields. **Additional features of C:** Enumeration, Command line parameters, Macros.

Text Books

1. Programming in ANSI C, E. Balagurusamy, TMH

Refernce Books

1. Programming with C, Gottfried, TMH, ISBN: 9780070145900
2. C The Complete Reference, Schildt, TMH, ISBN: 9780070411838
3. The c programming language,Brian W Kernighan & Dennis Ritchie, 2nd Edition Eastern Economy Edition, Prentice Hall.
4. Let us C, Yashavant Kanetkar, BPB publication, Fifteenth Edition
5. Programming in C, Pradip Dey, Manas Ghosh, Oxford Higher Education.

E Books/ Online learning material

1. www.coursera.org/specializations/c-programming
2. http://nptel.ac.in/courses/106/104/106104128/
3. www.cprogramming.com

Mapping of COs and POs

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2	1										1	1	
CO 2	1	2	2	2									1	2	
CO 3	1	2	3	2									1	2	
CO 4	1	2	3	2	2				1				1	2	
CO 5	1	2	3						1				3		

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	10	5	5	-	-
ISE II* 20 Marks	-	5	5	5	5
ESE Assessment 60 Marks	6	6	18	12	18

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	-	12
K2	Understand	5	-	18
K3	Apply	10	5	30
K4	Analyze	-	5	-
K5	Evaluate	-	5	-
K6	Create	-	5	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPCC1003 Database Management System		
Teaching Scheme	**Examination Scheme**	
Lectures : 03 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 03	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand various database models & entity relationship models.

CO2: Analyze data models to check the performance with respect to design and manipulations.

CO3: Apply structured query on database using SQL DDL/DML/DCL commands.

CO4: Implement a database schema for a given problem-domain.

CO5: Evaluate the normality of a logical data model, and correct any anomalies.

Course Contents

Unit No	Detailed Contents
1	**Introduction to Databases:** Introduction, Applications, Data Models, Schemas and Instances. Three Schema Architecture, Database Languages and Interfaces, The Database System Environment, Conceptual Data Modeling using Entities and Relationships, Roles and Structural Constraints, Weak and Strong Entity Sets, E-R Diagrams Examples, Specialization And Generalization.
2	**Relational Model & Relational Databases:** Structure of Relational Databases, Relational Algebra, Extended Relational Algebra Operations, SQL: Set Operations, Aggregate Functions, Nested-Sub Queries, Joined Relations, Views, Group By And Having Clauses, Domain Constraints, Referential Integrity.
3	**Database Normalization:** Introduction to Normalization Using Functional and Multi-valued Dependencies, Normal Forms- 1NF, 2NF, Boyce-Codd Normal Form, 4NF and 5NF.
4	**Data Storage:** Physical Storage Media, File Organization, Operations on Files, hashing Techniques, Indexing Structures for Files, Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B+Trees
5	**Transaction Management:** Transaction States, ACID Properties, Concurrent Executions, Serializability, Recoverability, Concurrency Control – Lock-Based Protocols, Timestamp and Validation Based Protocol, Recovery System- Log-Based Recovery, Shadow Paging, and Buffer Management.

Text Books

1. Fundamentals of Database Systems, R. Elmasri and S. Navathe,Addison-Wesley.
2. Database System Concepts, Silberschatz A., Korth H., Sudarshan S, McGraw Hill Publication, Sixth Edition

Refernce Books

1. Database Systems: Concepts, Design and Application, S. K. Singh, Pearson Publication
2. An Introduction to Database System, Bipin Desai, West Publications
3. Database Management Systems, 3rd Ed., R Ramakrishnan, J Gehrke, McGraw-Hill,
4. Database Systems: A Practical Approach to Design, Implementation and Management, Thomas M. Connolly, Carolyn E. Begg, Addison Wesley fifth Edition

E Books/ Online learning material

1. https://nptel.ac.in/courses/106/105/106105175/
2. http://www.nptelvideos.in/2012/11/database-management-system.html
3. https://freevideolectures.com/course/2668/database-management-system

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	1	
CO 2	1	2							1				1	2	
CO 3	1	2	3	1	2				1				1	2	
CO 4	1	2	3	2					1				1	2	
CO 5	1	2	1						1					3	

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	10	10	-	-	-
ISE II* 20 Marks	5	-	5	5	5
ESE Assessment 60 Marks	12	6	18	18	6

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	10	5	18
K2	Understand	10	5	24
K3	Apply	-	5	18
K4	Analyze	-	5	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCVSE1004 Web Programming & Scripting		
Teaching Scheme	Examination Scheme	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understanding basic principles and technique of web site design.

CO2: Use modern front end frameworks and browser features to develop complex web user interfaces.

CO3: Analyze, design and develop scalable web systems using Javascript,HTML,and JQuery.

CO4: Design the websites with good aesthetic sense of designing and technical know how's.

CO5: Design and develop fully functional dynamic web applications using the concepts of PHP

Course Contents

Unit No	Detailed Contents

1 **Overview of Internet Technology:**
Internet, web site, www, server, client, IP address, TCP/IP protocol. Detail Study of HTML: What is HTML, History, creating, installing, viewing, and checking web pages, TAGS, core HTML elements. **HTML links and addressing:** What are URL's, linking in HTML, Anchor attributes, Image maps. Presentation and layout: Image preliminaries, HTML image basics, maps and buttons, Text colors and background: Fonts colors in HTML, color attributes, background images. Forms posting methods (get, post).

2 **Introduction to Scripting Languages:**
Scripting Languages, Similarities and difference between Scripting Languages and Programming Languages, Advantages and Disadvantages of Scripting Languages, Use of Scripting Languages. **Java Script:** Introduction to JavaScript, Variables, Arrays, Loops, Conditional Statements, Functions, Cookies, DOM, Events, Object Oriented JavaScript, Internal & External JavaScript.

3 **JQuery:**
Introduction, Data Types, Objects, Arrays, Functions, Arguments, Scope, Built-in Functions, Selectors, use of Selectors, DOM Attributes, DOM Traversing, CSS Methods, DOM Manipulation Methods, Effects **AJAX:** Ajax Basics, Ajax Components, DOM, Passing Data, Server Side Code, API, Ajax Applications, Ajax/Java script Frameworks, Ajax Applications Client side validations, multi device compatibility, cross browser compatibility.

4 **PHP:**
PHP Basic syntax, PHP data Types, PHP Variables, PHP Constants, PHP Expressions, PHP Operators, PHP Control Structures, PHP Loops, PHP Enumerated Arrays, PHP Associative Arrays, Array Iteration, PHP Multi-Dimensional Arrays, Array Functions, PHP Functions, Syntax, Arguments, Variables,References,

Pass by Value & Pass by references, Return Values, Variable Scope, PHP include(), PHP require().

5   **PHP Form handling:**
PHP GET, PHP POST, PHP Form Validation, PHP Form Sanitization, PHP Cookie handling, PHP Session Handling, PHP Login Session, Managing user ACL, Strings and Patterns, Matching, Extracting, Searching Replacing, Formatting. (react/Angular).

Text Books
1. Web Design with HTML, CSS, JavaScript and jQuery Set, Jon Duckett
2. Head First PHP and MySQL, Lynn Beighley and Michael Morrison.

Refernce Books
1. HTML5 Black Book (Covers CSS3, Java Script, XML, XHTML, AJAX,PHP, jQuery) 2Ed, DTE editorial
2. The Joy of PHP: A Beginner's Guide, Alan Forbes

E Books/ Online learning material
1. https://onlinecourses.swayam2.ac.in/aic20_sp11/preview
2. https://www.coursera.org/learn/html-css-javascript-for-web-developers
3. https://onlinecourses.swayam2.ac.in/aic20_sp32/preview

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	1													
CO 2	2	2	1												
CO 3	1		1		1								2		
CO 4	1		1										1		
CO 5	2		2		2							3	2		

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	5	5	-	5
ISE II* 20 Marks	5	-	5	5	5
ESE Assessment 60 Marks	18	18	12	12	-

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	5	18
K2	Understand	10	5	24
K3	Apply	5	10	18
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPCC1005 Software Engineering		
Teaching Scheme	**Examination Scheme**	
Lectures : 03 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 03	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand and compare various Software Development Life Cycle models.

CO2: Identify user requirements and prepare System Requirement Specification document.

CO3: Prepare design as per System Requirement Specification document.

CO4: Write and apply appropriate test cases to the software system designed.

CO5: Integrate knowledge and skills to provide software maintenance to customer.

Course Contents

Unit No	Detailed Contents
1	**Introduction to Software Engineering Basic Terminologies:** What is Software & its Characteristics, requirements, specifications, design, testing, validation, evolution and project management, Software Crises and Myths, Software Engineering as a Layered Technology, Software Development Lifecycle, Agile view of Process.
2	**Software Process, requirements and specification:** Software Process, Process Framework, Generic and Umbrella activities, Process Patterns, Process Assessment, Various Process Models,Requirement Engineering -inception, elicitation, elaboration, negotiation, specification, validation & management, Analysis Modelling Techniques - UML Diagrams.
3	**Software Design:** Translating analysis model into design model, Fundamental design Concepts and Principles, Design Process, Quality Attributes, Software Architecture & Architectural Styles.
4	**Software Testing:** Testing Strategy for Conventional Software, Testing Fundamentals, Test Plan Creation and Test Cases Generation, Unit and Integration Testing, Black-box and White-box Testing Techniques, Validation, and System Testing.
5	**Software Evolution:** Software Maintenance - Corrective, Adoptive, Perfective, Structured and Un-Structured, The Associated Disciples and the Role and the Nature of the Configuration Management, Characteristics of Maintainable Software, Software Re-use strengths and weaknesses, Re-engineering.

Text Books

1. Software Engineering, Roger S. Pressman, TMH, 7th Edition, ISBN-978-0071267823

Approved in XXVIth Academic Council
Dated: 27th April 2023

Refernce Books

1. Effective Methods for Software Testing, William Perry, John Wiley & Sons, New York, 1995.
2. Software Testing Techniques, Second Volume, Second Edition, Boris Beizer, Van Nostrand Reinhold, New York, 1990.
3. Software Testing, Louise Tamres, Pearson Education Asia, 2002
4. Software Engineering, K. K. Aggarwal , Yogesh Singh , New Age International Publishers
5. Testing Computer Software, Second Edition, Cem Kaner, Jack Falk, Nguyen Quoc, Van Nostrand Reinhold, New York, 1993.

E Books/ Online learning material

1. https://nptel.ac.in/courses/106/105/106105087/
2. https://swayam.gov.in/nd1_noc19_cs69/preview
3. https://www.coursera.org/courses?query=software%20engineering

Mapping of COs and POs

PO\CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1														
CO 2	1	2								2				1	
CO 3	1	2	1							2				1	
CO 4	1	1													
CO 5	1	1													

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	10	10	-	-	-
ISE II* 20 Marks	5	5	-	5	5
ESE Assessment 60 Marks	18	18	6	6	12

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	10	5	24
K2	Understand	10	5	18
K3	Apply	-	-	18
K4	Analyze	-	5	-
K5	Evaluate	-	5	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPCC1006: Lab: Data Structures		
Teaching Scheme	**Examination Scheme**	
Practicals : 02 Hrs/Week	ISE I*	25 Marks
Credits : 01	End Semester Examination	25 Marks

Course Outcome - After studying this course, students will be able to

CO1: Implement data structures like stacks, queues, linked lists etc. using array and dynamic variables and compare these methods.

CO2: Implement complex data structures like trees & graphs in High level language.

CO3: Implement searching & sorting methods.

Course Contents (Indicative List of Experiments not restricted to)

1. Write a program for implementation of Stack.
2. Write a program for implementation of Queue.
3. Write a program for Singly Linked List.
4. Write a program for Creation of Binary Tree and operations on it.
5. Write a program for Creation of Binary Threaded Tree.
6. Write a program for Depth First search and Breadth First search.
7. Write a program for Bubble Sort.
8. Write a program for Merge Sort.
9. Write a program for Heap Sort.
10. Write a program for Insertion Sort
11. Write a program for Binary Search to search an element in the given sequence.

Mapping of COs and POs

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											2	1	
CO 2	1	2	3										2	1	
CO 3	1	2	3										2	1	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	10	10
S2	Manipulation	05	05
S3	Precision	05	05
S4	Articulation	05	05
S5	Naturalization	-	-
Total		**25**	**25**

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPCC1007 Lab Computer Programming		
Teaching Scheme	**Examination Scheme**	
Practicals : 04 Hrs/Week	ISE I*	50 Marks
Credits : 02	End Semester Examination	25 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand various programming problem specifications.

CO2: Design a high-level (programming language independent) solution to the problem.

CO3: Write, compile, execute and debug a C program which maps the high-level design onto concrete C programming constructs.

Course Contents (Indicative List of Experiments not restricted to)

1. Write a program to find largest of three numbers without using decision making statement or ternary operator.
2. Write a program to find factorial of a number.
3. Write a program to list prime numbers from 1 to 500 using for statement.
4. Write a program to test whether given number is palindrome using do while statement.
5. Write a program to test number is an Armstrong number using if and go to statement.
6. Write a program to find square, square root, cube, cube root using switch case
7. Write a program to test whether given number is prime using function.
8. Write a program to demonstrate call by value parameter passing technique.
9. Write a program to demonstrate call by reference parameter passing technique.
10. Write a recursive program to test whether given number is prime.
11. Write a program to display strong number from n to m by command line argument.
12. Write a program to search a number in the given array.
13. Write a program to multiply matrix A with B.
14. Write a program to sort an array using pointer.
15. Write a program to demonstrate nested structure.
16. Write a program to demonstrate bit fields in a structure.
17. Write a program to copy one file into another file.

Mapping of COs and POs

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											2	1	
CO 2	1	2	3										2	1	
CO 3	1	2	3		1								2	1	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	15	8
S2	Manipulation	15	7
S3	Precision	10	5
S4	Articulation	10	5
S5	Naturalization		
Total		50	25

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on the following

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPCC1008 Lab Data Base Management System		
Teaching Scheme	**Examination Scheme**	
Practicals : 04 Hrs/Week	ISE I*	50 Marks
Credits : 02	End Semester Examination	25 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand the scope of SQL and use it to query, update and manage a database

CO2: Demonstrate advanced programming and functional features of SQL.

CO3: Create database connectivity for management of the database.

Course Contents (Indicative List of Experiments not restricted to)

1. To execute all the Basic DDL (Data Definition language) commands (i.e. Create, Alter Drop, and Truncate) with example.
2. To execute all the Basic DML (Data Manipulation language) commands (i.e. Insert, Select, Update, and Delete) with example.
3. Practical Based on Implementing the Constraints.
   - NULL and NOT NULL
   - Primary Key Constraint
   - Foreign Key Constraint
   - Unique Constraint
   - Check Constraint
   - Default Constraint
4. Practical for Retrieving Data Using following clauses.
   - Simple select clause
   - Accessing specific data with Where
   - Ordered By
   - Distinct
   - Group By
5. Practical Based on Aggregate Functions.
   - AVG
   - COUNT
   - MAX
   - MIN
   - SUM
   - CUBE
6. To Execute the join Commands (i.e. Cartesian product, natural join, Inner join, left outer join, right outer join, equi join, non- equi join, and full join).
7. Practical based on SQL Sub-Queries.
8. Practical Based on Database Normalization.
9. Practical Based on implementing all String functions.
10. Practical Based on implementing Date and Time Functions.
11. Practical Based on performing different operations on a view.
12. Practical Based on implementing Cursor using PL/SQL.
13. Practical Based on demonstrating Exceptions using PL/SQL.
14. Practical Based on implementing Procedures using PL/SQL.
15. Practical Based on implementing Functions using PL/SQL.
16. Practical Based on implementing Packages using PL/SQL.
17. Practical Based on implementing Triggers using PL/SQL.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2	1										2	1	
CO 2	1	2	3										2	1	
CO 3	1	2	3										2	1	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	15	8
S2	Manipulation	15	7
S3	Precision	10	5
S4	Articulation	10	5
S5	Naturalization		
Total		50	25

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on the following�

 1. Performance in the practical examination.
 2. Record of programs submitted by the candidate.

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MCVSE1009 Lab Web Programming and Scripting		
Teaching Scheme	**Examination Scheme**	
Practicals : 02 Hrs/Week	ISE I*	25 Marks
Credits : 01	End Semester Examination	25 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand and implement the various concepts of HTML,CSS,Javascript,PHP.

CO2: Apply the concept of different front end and back end omponents in problem solving.

CO3: Develop solutions to complex problems using appropriate technologies, framework, web services and content management.

Course Contents (Indicative List of Experiments not restricted to)

1. To create a web page using basic HTML tags.
2. To create a web page using link, button & map tags.
3. To create a web page using table & multimedia tags.
4. To create a web page using css.
5. Create a form, put validation checks on values entered by the user using JavaScript (such as age should be a value between 1 and 150, Mandatory fields, Input Numbers only).
6. To create a text box and submit button of event handling submit form () using AJAX.
7. Develop a dynamic webpage demonstrating the use of AJAX and APIs.
8. Program to PHP Enumerated Arrays, PHP Associative Arrays, Array Iteration, PHP Multi-Dimensional Arrays, Array Functions.
9. String Handling in PHP.
10. Program to PHP Form handling, PHP GET, PHP POST, PHP Form Validation, PHP Form Sanitization.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1														
CO 2	1	2	1		1									1	
CO 3	2	2	1		2							2	1	1	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	8	8
S2	Manipulation	8	8
S3	Precision	5	5
S4	Articulation	4	4
S5	Naturalization		
Total		25	25

Approved in XXVIth Academic Council
Dated: 27th April 2023

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on the following

    1. Performance in the practical examination.

    2. Record of programs submitted by the candidate.

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPCC1010: Object Oriented Programming with Java		
Teaching Scheme	Examination Scheme	
Lectures : 03 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 03	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand OOP concepts and Java programming environment.

CO2: Demonstrate the various programming constructs in Java programming language.

CO3: Create Java application programs using sound OOP practices.

CO4: Apply testing and debugging to discover errors.

CO5: Develop stand alone applications with GUI and database connectivity.

Course Contents

Unit No	Detailed Contents

1   **Fundamentals of Object Oriented Programming:**
OOP concepts: Class, object, message passing, Abstraction, Inheritance, Encapsulation, Polymorphism, OOP Vs conventional programming, Access Modifiers.

2   **Java Fundamentals:**
Introduction to Java: History and evolution, Types of Java applications, Java features, Java programming environment, JVM, JRE and JDK, Byte code, The Java Class Libraries, Basics of Java Programming, Type Casting, Wrapper Classes, Single Dimension and Multi-Dimensional Arrays.

3   **Java Memory Model:**
Objects and classes, Method Overloading, String Class, Constructors in Java, Static Members in Java, Inheritance and its types, Method Overriding, Inner classes in java, Interfaces, Abstract Class and Abstract Methods, This Keyword, Packages in Java, Garbage Collection and finalize method.

4   **Multithreading and Exception Handling:**
Multithreading and Multitasking, Thread Programming- the start and run methods, Extending the Thread Class, Implementing the Runnable Interface, Thread States, Lifecycle of a Thread, Thread Priority, Thread Synchronization, Daemon Thread. Exception and its types, Checked and Unchecked exceptions, throws keyword.

5   **GUI Programming:**
Introduction to GUI, Introduction to AWT packages and its Classes, AWT Events, Applets in Java, Life Cycle of an Applet, AWT Component Classes, Event Handling in an Applet, Introduction to Swing, Swing Component Classes, Event Handling in Swing, AWT vs Swing, Mouse Events, Keyboard Events, Introduction to Graphics Class and its Methods.

Text Books
1. Programming with JAVA, 2nd Ed, E. Balgurusamy, TMH
2. Thinking in Java, 3rd Edition, Bruce Eckel, Prentice-Hall

Refernce Books
1. Java 2 Complete Reference, Herbert Schildt and Patrick Naughton, McGraw Hill
2. Java Swing, 2nd Edition, Dave Wood, Marc Loy, James Elliott, Brian Cole.
3. Core Java-Part 1,Sun Microsystems Press
4. A Programmer's Guide to Java Certification, Khalid Mughal, Rolf Rasmussen

E Books/ Online learning material
1. https://nptel.ac.in/courses/106/105/106105191/
2. https://swayam.gov.in/nd1_noc19_cs84/preview
3. https://www.coursera.org/courses?query=core%20java

Mapping of COs and POs

PO→ CO↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	2	
CO 2	1	2											1	2	
CO 3	1	2	3		2								1	2	
CO 4	1	2	1										1	1	
CO 5	1	2	3		2									2	

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	10	10	-	-	-
ISE II* 20 Marks	5	5	-	5	5
ESE Assessment 60 Marks	6	12	18	12	12

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	-	-	-
K2	Understand	-	-	-
K3	Apply	-	-	-
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		0	0	0

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPCC1011 Python Programming		
Teaching Scheme	**Examination Scheme**	
Lectures : 03 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 03	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand the basic structure of python application development.

CO2: Understand different data constructs in python like lists, tuples, sets & dictionaries.

CO3: Analyse various control structures, methods and exception handling concepts in python.

CO4: Design and development of applications using python classes.

CO5: Develop a python application using database connectivity.

Course Contents

Unit No	Detailed Contents

1   **Introduction:**
Introduction to python, identifiers, variables, indentation in python, input and output functions, operators, data types – numbers, strings, list, tuple, set, dictionary, data type conversion.

2   **Conditional and control statements:**
Decision making, loops, nested loops, control statements – break, continue, pass, operations on data types.

3   **Functions:**
Function definition, function calling, function arguments – required, keyword, default, variable length, Anonymous functions, recursive functions.

4   **Functions:**
Built in modules, creating modules, import statement, packages in python, importing modules from package.
Object oriented programming – class definition, creating objects, built in attribute methods and class methods, inheritance, operator overloading.

5   **Exception handling:**
Built in exceptions, handling exceptions, raising an exception, user defined exceptions, assertions in python.
File Handling – opening a file, closing a file, writing to a file, reading from a file, file methods.
Data base programming – connecting to data base, creating tables, operations on tables, exception handling in data base.

Text Books

1. Taming python by programming, Dr. Jeeva Jose, Khanna Publishing, 2018

Refernce Books

1. Python Crash Course, Eric Matthes, No Starch Press, 2016
2. Learn Python-3 The Hard Way, Zed A. Shaw, Addison-Wesley, 2016
3. Think Python First Edition, by Allen B. Downey, Green Tea Press
4. Python - The Complete Reference by Martin C. Brown, McGraw Hill Education; Forth edition

E Books/ Online learning material

1. https://nptel.ac.in/courses/106/106/106106182/
2. https://swayam.gov.in/nd1_noc19_cs41/preview
3. https://docs.python.org/3/tutorial/
4. http://www.codecademy.com/tracks/python
5. http://corepython.com/

Mapping of COs and POs

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	1	
CO 2	1	2											1	1	
CO 3	1	2	3		2								1	2	
CO 4	1	2	3		2								1	2	
CO 5	1	2	3		2								1	2	

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	10	5	-	-
ISE II* 20 Marks	-	5	5	5	5
ESE Assessment 60 Marks	12	12	18	12	6

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	5	12
K2	Understand	5	5	24
K3	Apply	10	-	24
K4	Analyze	-	5	-
K5	Evaluate	-	5	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPCC1012 Information Security		
Teaching Scheme	**Examination Scheme**	
Lectures : 03 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 03	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Identify and solve different information security issues.
CO2: Development of secure cryptosystem.
CO3: Design of basic biometric system application.
CO4: Development of biometric security algorithm.
CO5: Identify and investigate network security threats.

Course Contents

Unit No	Detailed Contents

1 **Information Security:**
Introduction to IS, CIA model, computer security concepts, security attacks, security services, security mechanisms, a model for network security.

2 **Message Authentication codes:**
Message Authentication requirements, Message Authentication functions, Digital Signature, Elgamal digital signature scheme, Hash Function, Cryptographic Hash Function, Secure Hash Algorithm (SHA) and Application of Cryptographic hash Functions.

3 **Cryptography:**
Basics of Cryptography, Elementary Ciphers (Substitution, Transposition and Ceaser cipher), Random and Pseudorandom Numbers , Stream Ciphers and RC4 ,Cipher Block Modes of Operation, Block Cipher. Data Encryption Standard (DES), Introduction to Public Key, Advanced Encryption Standard (AES), Cryptosystem, Diffie-Hellman Key Exchange, RSA Cryptosystem.

4 **Network access control:**
Transport layer security, secure shell (SSH)- transport layer protocol, user authentication protocol, connection protocol Electronic mail security – PGP, S/MIME.

5 **Biometrics security:**
Biometric identification, verification, authentication, different biometric techniques, biometric design steps, face recognition system, fingerprint recognition system, biometric template security, fuzzy vault algorithm.

Text Books
1. Cryptography and Network Security, 5th Edition, William Stallings,Pearson.
2. Network Security and Cryptography, Bernard Menezes, Cengage, 2010.

Refernce Books
1. Information Security and cyber laws, Saurabh Sharma, Student series, Vikas publication
2. Network Security: The Complete Reference, Keith Strassberg, Mark Rhodes-Ousley, and Roberta Bragg.

E Books/ Online learning material
1. https://nptel.ac.in/courses/106/106/106106129/
2. https://bit.ly/3jAmS7k

Mapping of COs and POs

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	1	
CO 2	1	2		2		1							1	1	1
CO 3	1	2	2										1	1	
CO 4	1	2	2										1	1	
CO 5	1	2		2	1			1					1	2	

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	10	10	-	-	-
ISE II* 20 Marks	5	-	5	5	5
ESE Assessment 60 Marks	15	15	10	10	10

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	10	5	20
K2	Understand	5	5	20
K3	Apply	5	-	10
K4	Analyze	-	5	5
K5	Evaluate	-	5	5
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPEC1013 : Data Science		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: To get an understanding of machine learning techniques for text classification and clustering.

CO2: To study the various probability-based learning techniques.

CO3: To apply the core skills in visualization for time series, data analysis../li>

CO4: Apply statistical and other research tools to analyze and interpret data.

CO5: To understand the role and stages of data science projects.

Course Contents

Unit No	Detailed Contents

1
Introduction:
What Is Data Science? Where Do We See Data Science? How Does Data Science Relate to Other Fields? The Relationship between Data Science and Information Science, Computational Thinking, Skills for Data Science, Tools for Data Science, Issues of [Ethics, Bias, and Privacy in Data Science]

2
Data:
Introduction, Types of Data, Structured Data, Unstructured Data, Challenges with Unstructured Data, Data Collection, Data Pre-processing, Data Cleaning, Data Integration, Data Transformation, Data Reduction, Data Discretization.

3
Techniques:
Data Analysis and Data Analytics, Descriptive Analysis, Diagnostic Analytics, Predictive Analytics, Prescriptive Analytics, Exploratory Analysis, Mechanistic Analysis.

4
Tools for Data Science:
Introduction to R, Getting Access to R, Getting Started with R, R Basics, Control Structures, Functions, Importing Data, Graphics and Data Visualization, Installing ggplot, Loading the Data, Plotting the Data, Statistics and Machine Learning, Basic Statistics, Regression, Classification, Clustering.

5
Applications, Evaluations, and Methods:
Data Collection Methods: Introduction to Quantitative and Qualitative Methods
Evaluation: Comparing Models, Training–Testing and A/B Testing, Cross-Validation
Hands-On with Solving Data Problems: Collecting and Analyzing Twitter / YouTube Data

Text Books

1. A Hands-On Introduction to Data Science, Second Edition, Chirag Shah, Cambridge Press.
2. Introduction to Data Science, Rafael A. Irizarry, Hardward CRC Press

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Dated: 27th April 2023

Refernce Books

1. The Data Science Handbook: Advice and Insights from 25 Amazing Data Scientists, Carl Shan, William Chen, Data Science Bookshelf.
2. Data Science (The MIT Press Essential Knowledge series), John D. Kelleher and Brendan Tierney, Part of: The MIT Press Essential Knowledge series.
3. Foundations of Data Science 1st Edition, Avrim Blum , John Hopcroft, Ravindran Kannan Cambridge University Press.

E Books/ Online learning material

1. https://swayam.gov.in/nd1_noc19_cs60/preview

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	1	
CO 2	1	2	3		2								1	1	
CO 3	1	2	1										1	1	
CO 4	1	2	1										1	1	
CO 5	1	2	1										1	1	

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	10	-	5	-
ISE II* 20 Marks	-	-	5	10	5
ESE Assessment 60 Marks	18	18	12	12	-

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	-	18
K2	Understand	10	5	24
K3	Apply	5	10	18
K4	Analyze	-	5	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPEC1014 : Soft Computing		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand the basic concepts of ANN

CO2: Understand different ANN training algorithms

CO3: Understand Fuzzy logic concepts and apply it for simple applications

CO4: Design ANN using supervised and unsupervised learning algorithms

CO5: Apply ANN and fuzzy logic for application development

Course Contents

Unit No   **Detailed Contents**

1   **Introduction to ANN:**

Basic terminology, Biological neurons and its working, Simulation of biological neurons to problem solving, Different ANNs architectures, Training techniques for ANNs, Applications of ANNs to solve some real life problems.

2   **Pattern recognition and data classification:**

Pattern recognition and data classification, neuron signal functions, Non-linearly separable problems, XOR problem, perceptron learning algorithm

3   **Multilayer network**

Multilayer network, Back propagation algorithm, function approximation and NN, applications of FFNN, learning from examples and generalization, radial basis function network

4   **Self organization:**

Self organization, competitive learning, vector quantization, Mexican hat networks, self organizing feature map, applications of self organizing feature map

5   **Fuzzy sets and fuzzy systems:**

Fuzzy sets and fuzzy systems, need for numeric and linguistic processing, fuzzy uncertainty and the linguistic variable, fuzzy sets, membership functions, simple operations on fuzzy sets, fuzzy rules, applications

Text Books

1. Neural Network – A classroom approach, Satish Kumar, Tata McGraw hill

2. Fuzzy logic, F. Martin McMeill, Academic Press Inc

Refernce Books

1. Artificial Neural Network, Yagnanarayana

2. Soft Computing techniques, N.P. Padhy , S.P. Simon, Oxford University Press

3. Soft Computing: Neural Networks, Fuzzy Logic and Genetic Algorithms, Sushil Kumar Singh, Galgotia Publications (P) Ltd

Approved in XXVIth Academic Council
Dated: 27th April 2023

E Books/ Online learning material
1. https://swayam.gov.in/nd1_noc20_cs17/preview
2. www.mathworks.com

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	1	
CO 2	1	2	3		2								1	1	
CO 3	1	2	1										1	1	
CO 4	1	2	1										1	1	
CO 5	1	2	1										1	1	

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	10	5	-	-
ISE II* 20 Marks	-	5	5	5	5
ESE Assessment 60 Marks	12	18	12	18	-

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	-	12
K2	Understand	10	5	24
K3	Apply	5	5	24
K4	Analyze	-	5	-
K5	Evaluate	-	5	-
K6	Create	-	-	-
Total		20	25	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPEC1015 : Data Mining		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: To understand the data extraction, transmission and loading with the various tools.

CO2: Ability to solve real world problems in scientific information using data mining techniques.

CO3: To Understand and apply the most current data mining techniques and applications, such as text mining, mining genomics data, and other current issues.

CO4: To design and analyse the data with the OPAL tools.

CO5: Ability to apply an association-rules on large data sets.

Course Contents

Unit No	Detailed Contents
1	**Introduction to Data Mining:** What is data mining? Related technologies - Machine Learning, DBMS, OLAP, Statistics, Data Mining Goals, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Applications, Example: weather data.
2	**Data mining algorithms:** Association rules, Motivation and terminology, Example: mining weather data, Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis, Classification, Basic learning/mining tasks, Inferring rudimentary rules: 1R algorithm, Decision trees, Covering rules.
3	**Data mining algorithms:** Prediction, The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbour), Linear models.
4	**Clustering:** Basic issues in clustering, First conceptual clustering system: Cluster/2, Partitioning methods: k-means, expectation maximization (EM), Hierarchical methods: distance-based agglomerative and divisible clustering, Conceptual clustering: Cobweb.
5	**Advanced techniques:** Data Mining software and applications, Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing). Bayesian approach to classifying text, **Web mining:** classifying web pages, extracting knowledge from the web, Data Mining software and applications.

Approved in XXVIth Academic Council
Dated: 27th April 2023

Text Books

1. Data Mining: Practical Machine Learning Tools and Techniques, (Second Edition), Ian H. Witten and Eibe Frank, Morgan Kaufmann, 2005
2. Data Mining: Concepts and Techniques, second edition., Jiawei Han,Micheline Kamber, Morgan Kauffman

Refernce Books

1. Data Mining -Introductory and advanced topics, Margaret Dunham, Pearson education
2. Data Mining for Business Intelligence, Galit Shmueli, Nitin R.Patel, Peter C.Bruce, Wiley India Edition
3. Mastering Data Mining, Michael J.A.Berry, Gordon S.Linoff, Wiley Student Edition
4. Handbook of Statistical Analysis and Data Mining Applications, Robert Nisbet, John Elder, Gary Miner, Elsevier
5. Mining the Web: Discovering Knowledge from Hypertext Data, Soumen Chakrabarti

E Books/ Online learning material

1. https://swayam.gov.in/nd1_noc20_cs92/preview
2. http://planetbigdata.com/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	1	
CO 2	1	2	3		2								1	1	
CO 3	1	2	1										1	1	
CO 4	1	2	1										1	1	
CO 5	1	2	1										1	1	

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	-	-	-	-	-
ISE II* 20 Marks	-	-	-		
ESE Assessment 60 Marks	-				-

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember			
K2	Understand			
K3	Apply			
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		**20**	**20**	**60**

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPCC1016 : Lab. Object Oriented Programming with Java		
Teaching Scheme	**Examination Scheme**	
Practicals : 04 Hrs/Week	ISE I*	50 Marks
Credits : 02	End Semester Examination	25 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand object oriented concepts like classes, objects, inheritance, polymorphism resembling real time situation.

CO2: Understanding Java development Environment such as Eclipse, NetBeans etc.

CO3: Create JAVA programs based on simple constructs like arrays, loops , decision statements, functions etc

Course Contents (Indicative List of Experiments not restricted to)

1. Write a Java program:
   - For creating Fibonacci series up to 'n' terms
   - To check for Prime number
   - To check for Armstrong number
   - To generate Reverse number
   - To check for Palindrome number

2. Write a java program for accepting 10 integer numbers and sort them in ascending order using bubble sort.

3. Write a java program to demonstrate 2D array by finding
   - Addition of Two 3*3 Matrices
   - Multiplication of Two 3*3 Matrices).

4. Write a program in java to demonstrate the various methods of string class and their use with example.

5. Write a java program to demonstrate various Java constructors in a single program (Default, Parameterized, Copy).

6. Write a program in java to demonstrate:
   - Single inheritance
   - Multilevel inheritance.

7. Write a java program to demonstrate Multiple Inheritance achieved using Interface.

8. Write a Java Program for creating user defined packages (at least 2 packages)and access the classes of these packages in another program.

9. Multithreading in Java:
   - Write a Simple Java program to demonstrate use of Threads by implementing Runnable Interface & by extending Thread class
   - Write a Simple Java program to demonstrate suspend(), resume() and stop() methods of a thread.
   - Write a java program to demonstrate sleep(), wait(), notify(), notifyall(), yield() methods of a thread.

10. Write a Java Program to demonstrate exception handling mechanism.

11. Applet Programming: Write a java program for accepting user input through applet using AWT Components..

12. AWT:
    - Create a java applet to demonstrate the various mouse event handlers
    - Create a java applet to demonstrate the various keyboard event handlers using interface.

13. SWING: Write a java program to create a GUI using various swing components and

implement event handling in it the various keyboard event handlers.

Mapping of COs and POs

PO → / CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	2	
CO 2	1	2											1	2	
CO 3	1	3	3						2				1	3	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	15	08
S2	Manipulation	15	07
S3	Precision	10	05
S4	Articulation	10	05
S5	Naturalization	-	-
Total		50	25

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on
   1. Performance in the practical examination.
   2. Record of programs submitted by the candidate.

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MCPCC1017 Lab. Python Programming		
Teaching Scheme	**Examination Scheme**	
Practicals : 04 Hrs/Week	ISE I*	50 Marks
Credits : 02	End Semester Examination	25 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand the basic concepts of scripting.

CO2: Explore the object oriented concepts of Python programming language.

CO3: Create python programs using files and databases.

Course Contents (Indicative List of Experiments not restricted to)

1. Write a program to find largest and smallest of three integer numbers without using decision making statements
2. Write a program to swap values of two variables using bitwise operator
3. Write a program to print non prime numbers from the given range using for loop
4. Write a program to add digits of a number using while loop
5. Write a program to Search whether all characters in one string are available into another string
6. Write a program for Result Processing using nested list
7. Write a program for Result Processing using dictionary
8. Write a program to convert words into numbers using dictionary and list.
9. Write a program to count digits of number using function
10. Write a program to check whether the given number is palindrome by passing function name as an argument to another function
11. Write a program to demonstrate use of lambda function with map and reduce functions.
12. Write a program to demonstrate calling function from another file
13. Write a program to demonstrate creating and importing a package
14. Write a program to demonstrate hierarchical inheritance
15. Write a program to demonstrate binary operator overloading
16. Write a program to demonstrate exception handling using raise, try, exept and finally statements.
17. Create a list of 10 elements. Write a program to write this list in binary file and then read it back to find out the smallest and largest value.
18. Write a function in Python to count and display the total number of words in a text file.
19. Write a program to create a table and insert some records in that table. Then selects all rows from the table and display the records.

Mapping of COs and POs

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	1	
CO 2	1	2	2										1	3	
CO 3	1	3	3						2				1	3	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	15	08
S2	Manipulation	15	07
S3	Precision	10	05
S4	Articulation	10	05
S5	Naturalization	-	-
Total		**50**	**25**

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on

1. Performance in the practical examination.

2. Record of programs submitted by the candidate.

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MCPCC1018 Lab. Information Security		
Teaching Scheme	**Examination Scheme**	
Practicals : 02 Hrs/Week	ISE I*	25 Marks
Credits : 01	End Semester Examination	25 Marks

Course Outcome - After studying this course, students will be able to

CO1: Implement security algorithm for authentication.

CO2: Implement basic biometric system application.

CO3: Implement Cryptosystems and analyze it.

Course Contents (Indicative List of Experiments not restricted to)

1. Write a program that contains a string with a value "Hello world". The program should XOR each character in this string with 0 and displays the result.
2. Write a Java program to perform encryption and decryption using the Ceaser cipher algorithm.
3. Write a Java program to perform encryption and decryption using the substitution cipher algorithm.
4. Implement DES Encryption and Decryption
5. Implement the Play fair Cipher
6. In a RSA System, the public key of a given user is e=31, n=3599. Write a program to find private key of the User.
7. Write a program for random number generation.
8. Calculate the message digest of a text using the SHA-1 algorithm
9. Develop a biometric system application.
10. Write a program for fuzzy vault algorithm.

Mapping of COs and POs

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2											1	1	
CO 2	1	2	2										1	3	
CO 3	1	3	3						2				1	3	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation		08
S2	Manipulation		07
S3	Precision		05
S4	Articulation		05
S5	Naturalization	-	-
Total		25	25

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.

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MCPCC2001: Adv. Java		
Teaching Scheme	**Examination Scheme**	
Lectures : 03 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 03	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand Socket programming and create a RMI application.

CO2: Develop a mini project using Java Servlet

CO3: Create web application using Java Server Pages technology and understand MVC Architecture.

CO4: Design the application using advanced environment with Hibernate, Struct &Spring.

CO5: Understand Maven project and execute J-unit testing.

Course Contents

Unit No	Detailed Contents

1   **Introduction to Networking and RMI**
Basics Of Networking, Overview Of The OSI Model, Socket Programming, Client Sockets And Server Socket, Multicast Sockets
RMI: Introduction To Distributed Computing, RPC, Introduction To RMI, Stubs And Skeletons, The Process Of Creating A Simple RMI Application

2   **Servlets**
Introduction To Web Application Development, Introduction of a 2 & 3 Tier Architecture, Server Side Programming, Introduction To Servlets, Comparing Servlets With CGI, Servlet Lifecycle, Servlet With Html, Server Side Includes, Servlet Chaining, HTTP Tunnelling, Session Management, Servlets With JDBC, Inter Servlet Communication, Deployment Descriptor (web.XML), Servlet Context & Config Objects, Event Handling in Servlet, Jasper Report generation & Calling Using Servlet.

3   **Java Server Page and MVC Architecture**
Introduction, Difference between Servlet &JSP ,Basic Tags (Scriptlet, expression, directives ,declaration), Basic Objects (out, session, request, application), Action tags(forward, include etc.), Java Server Tag Library
Introduction to MVC: Role of MVC in Servlet and JSP architecture.

4   **Hibernate, Structs and Spring**
Introduction, difference between hibernate &JDBC, Architecture of hibernate & ORM understanding, Steps to configure hibernate & create sample program, Introduction to HQL & work with database
Struct: Introduction &History, Struts with Hibernate, Struts with Spring, Struts with JDBC
Spring: Spring Core Module, Spring J2EE module, Spring ORM, Spring JDBC, Spring AOP(Aspect Oriented Module),Spring Web MVC module

5	**Maven project and Web services**

Maven :What is Maven, ANT Vs Maven, Install Maven, Maven Repository, Local Repository, Central Repository, Remote Repository, Maven Pom.xml, Maven Example, Maven Web App, Maven Plug-in Web service :WS Components, SOAP Web Service, RESTful Web Service, SOAP vs. RESTSOA, Java Web Services

J-unit Testing: Types of Junit Testing, Assert Classes

JAXB : What is JAXB, features of JAXB, Object to XML, XML to Object

Text Books

1. Java Programming: A practical approach, C. Xavier, McGraw Hill India Education 2011.
2. The Complete Reference – Java 2, 8thEdition, Herbert Scheldt, Tata McGraw Hill, 2011.

Refernce Books

1. Programming With Java – A Primer, E. Balagurusamy, 4th Edition, Tata McGraw-Hill, 2010
2. Core Java Part 2 Advanced Features – Sun Microsystems press
3. J2EE™ Tutorial, 2nd Edition, Eric Armstrong, Jennifer Ball, Stephanie Bodoff, Stephanie Bodoff, Stephanie Bodoff, Debbie Carson, Ian Evans, Dale Green, Kim Haase, Eric Jendrock. Published by Addison Wesley
4. Java Design Patterns: A Tutorial, James W. Cooper Addison Wesley Pearson Press
5. Struts in Action, Ted Husted, Manning Publications Company.

E Books/ Online learning material

1. https://www.edureka.co/blog/advanced-java-tutorial
2. https://www.w3schools.in/java-tutorial/
3. https://nptel.ac.in/courses/106/105/106105191/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	3								1				1	
CO 2	1	3								1					
CO 3	1	3	2		1					1	1	1	1		
CO 4	1	3	2	2	1					1		2	1		
CO 5	1	3	2	2		1		1	1	1	1	1	2	2	1

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	5	5	-	5
ISE II* 20 Marks	5	5		5	5
ESE Assessment 60 Marks	10	10	15	15	10

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	5	18
K2	Understand	10	5	24
K3	Apply	5	10	18
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		**20**	**20**	**60**

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPCC2002 : ASP.Net and C#		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand the ASP.Net web application execution model.

CO2: Understand web application configuration and demonstrate the ability to manage basic configuration issues.

CO3: Design and develop client and server side web applications using services.

CO4: Create and use libraries in the application programs.

CO5: Develop a mini project using .Net technologies.

Course Contents

Unit No	Detailed Contents
1	**Getting Started with .NET:** Introduction to .NET Framework and Visual Studio.NET, Kind of Applications that can be developed using Visual Studio.NET, Website v/s Web Application, Creating a new sample Web Project with Visual Studio **Creating Presentation Layer:** Creating Front-End with the HTML & CSS, Grid Layout v/s Liquid Layout, using Cascaded Style Sheets
2	**Introduction to C#:** Working with Variables, Data Types, Data Type Conversion, Operators and Expressions, Creating Classes and Objects in C#, Using Namespaces, Arrays, Exception Handling in C#, Navigating amongst Web Pages, Event Handling **Important Files and Folders in Web Application:** All System Folders, Web.Config, Global.asax, Building sites with Master Pages, Using User Controls
3	**Building ASP.NET Pages:** Standard Controls, Validation Controls, **State Management:** ASP.NET Page Life Cycle, Session Management, Managing Query String, View State in C#
4	**Working with Data:** ADO.NET Architecture, Connected & Disconnected Architectures, SQL Connection, SQL Command & important Classes for operating database related operations (CRUD), Using Datasets& Data Adapters **Working with Data Controls:** Grid View, Repeater Control
5	**AJAX:** Ajax Architecture, Script Manager, Update Panel, Ajax Control Toolkit **Web Services:** Creating and Consuming Web Services **Deploying ASP.NET Websites:** Installing and configuring website using IIS

Text Books

1. Professional ASP.NET MVC 5 (WROX), Jon Galloway and Brad Wilson
2. ASP.NET 3.5 unleashed, Stephan Walther

Refernce Books

1. The Complete Reference ASP.NET, Tata McGraw Hill
2. The Complete Reference C#
3. Microsoft ASP.NET 4.0 Step by Step, George Shepherd, Microsoft Press
4. Programming ASP.NET CORE, Dino Esposito
5. C# in Depth, Jon Skeet

E Books/ Online learning material

1. https://www.tutorialspoint.com/asp.net_mvc/asp.net_mvc_useful_resources.html
2. https://www.w3schools.com/asp/default.ASP

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	3												1	
CO 2	1	3													
CO 3	1	3	2		1								1		
CO 4	1	3	2		1								1		
CO 5	1	3	2	2	2	1		1	1	1	1	1	2	2	1

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	5	5	5	-
ISE II* 20 Marks	5	-	5	5	5
ESE Assessment 60 Marks	18	18	12	12	-

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	5	18
K2	Understand	5	5	24
K3	Apply	10	10	24
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		20	20	66

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCEEM2003 : Enterprise Resource Planning		
Teaching Scheme	**Examination Scheme**	
Lectures : 03 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 03	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understanding the steps and activities in the ERP life cycle

CO2: Analyse the strategic options for ERP identification and adoption.

CO3: Design the ERP implementation strategies.

CO4: Create reengineered business processes for successful ERP implementation.

CO5: Obtain practical hands-on experience with one of the ERP Software.

Course Contents

Unit No	Detailed Contents

1 **Introduction:**
What is ERP, Why ERP, Need for Enterprise Resource Planning, Definition of ERP, Evolution of Enterprise Resource Planning, Pre material requirement planning (MRP stage) Material requirement planning, MRP- II, ERP, Extended ERP, ERP Planning –II, ERP-A manufacturing perspective, Risks and benefits – ,Risk implementation, Fundamental technology of ERP Issues to be consider in planning design and, implementation of cross functional integrated ERP systems.

2 **ERP Solution and Functional Modules:**
Overview of ERP software solutions, Small, medium and large enterprise vendor solutions, Business process Reengineering, Business process Management, Steps of BPM, Functional Modules, ERP Production planning module, ERP purchasing module, ERP Inventory control module, ERP Sales module, ERP Marketing module, ERP Financial module, ERP HR module

3 **ERP Implementation:**
Planning Evaluation and selection of ERP systems, ERP Implementation life cycle, Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap-Analysis, Reengineering, Configuration Implementation Team Training, Testing, Going Live, End-user training, Post – implementation, ERP implementation, Methodology and Frame work, Training, Data Migration, People Organization in implementation, Consultants and Vendors, Employees.

4 **Post Implementation:**
ERP Implementation, Maintenance of ERP, Organizational and Industrial impact, Success factors of ERP Implementation, Key success factors, Failure factors of ERP Implementation.

5 **Emerging Trends on ERP:**
Extended ERP systems and ERP add-ons, CRM, Benefits of ERP Module, Supply Chain Management (SCM), Business analytics & Intelligence, Wireless Technology used in ERP, Future trends in ERP, Cloud Computing, SAP and the Internet

Text Books

1. Enterprise Resource Planning, Second Edition, Alexis Leon, TMH
2. Enterprise resource planning, 2nd Edition , Vinod Kumar Garg, N. K. Venkita Krishna, PHI, 2003

Refernce Books

1. ERP in practice, Vaman, TMH
2. Enterprise Resource Planning Systems, Daniel E.O'Leary, Cambridge University Press,2002
3. Concepts in Enterprise resource planning, Ellen Monk, Bret Wagner, Cengage learning, Third edition, 2009.
4. Essentials of Business Processes and Information Systems, Simha R. Magal and Jeffrey Word ,2010,
5. ERP-A Managerial Perspective, S. Sadagopan, McGraw Hill

E Books/ Online learning material

1. https://nptel.ac.in/courses/110/105/110105083/
2. www.openerp.com
3. www.sap.com

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	1													
CO 2	1	1	2										1	1	
CO 3	1	1	2										1	1	
CO 4	1	1	2										1	2	
CO 5	1	2	3	1	3			1	1	1	1		1	2	1

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	5	5	5	-
ISE II* 20 Marks	-	5	5	5	5
ESE Assessment 60 Marks	18	18	18	6	-

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	10	24
K2	Understand	10	5	24
K3	Apply	5	5	12
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPEC2004: Software Quality Assurance		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understanding fundamental concepts of software quality assurance with respect to SDLC and PDLC.

CO2: Understanding different standards, certifications and assessments for SQA.

CO3: Apply the concepts in preparing the quality plan & documents.

CO4: Analyzing and estimating cost of a T&QA project, maintenance of project and manage budgets

CO5: Design and develop test cases for existing software projects.

Course Contents

Unit No	Detailed Contents

1 **Introduction to software quality & architecture:**
Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition and objectives – Software quality factors- McCall quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans.

2 **SQA components and project life cycle:**
Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management.

3 **Software Quality Infrastructure:**
Procedures and work instructions - Templates - Checklists – 3S development - Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit - Documentation control – Storage and retrieval.

4 **Software Quality Management & Metrics:**
Project process control, Computerized tools, Software quality metrics, Objectives of quality Measurement, Process metrics, Product metrics, Implementation, Limitations of software metrics, Cost of software quality, Classical quality cost model, Extended model, Application.

5   **Standards, Certifications & Assessments:**
Quality management standards – ISO 9001 and ISO 9000-3 – capability Maturity Models – CMM and CMMI assessment methodologies - Bootstrap methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities – SQA units and other actors in SQA systems.

Text Books
1. Software Quality Assurance ,Daniel Galin, Pearson Publication, 2009.
2. Effective Methods for Software Testing, Third edition, William E. Perry, Wiley India, 2009

Refernce Books
1. Software Quality: Theory and Management, Alan C. Gillies, International Thomson Computer Press, 1997.
2. Software Testing and Quality Assurance Theory and Practice, Kshirsagar Naik, Priyadarshi Tripathy
3. Software Quality Engineering – Testing, Quality Assurance and Quantifiable Improvement, Jeff Tian, Wiley India, 2006.
4. Total Quality Management, Dale H. Besterfield, Prentice Hall, 2003.
5. Software Testing – Principles and Practices, Naresh Chauhan, Oxford University Press, 2010.

E Books/ Online learning material
1. https://nptel.ac.in/courses/106/101/106101061/
2. https://nptel.ac.in/courses/106/105/106105150/
3. https://www.udemy.com/course/introduction-to-software-testing-or-software-qa/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1														
CO 2	1														
CO 3	1	1													
CO 4	1	1	2		2						1		1	1	
CO 5	1	1	2		3			1	1		1		2	2	2

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	5	5	5	-
ISE II* 20 Marks	-	5	5	5	5
ESE Assessment 60 Marks	12	18	12	12	6

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	5	24
K2	Understand	5	5	24
K3	Apply	10	10	12
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		**20**	**20**	**60**

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPEC2005 : Machine Learning		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand basics of machine learning techniques

CO2: Understand a wide variety of learning algorithms

CO3: Analyze various neural network models for application development.

CO4: Develop skills of using recent machine learning techniques and solve practical problems.

CO5: Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models

Course Contents

Unit No	Detailed Contents

1 **Probability Theory:**

Probability Theory, Linear Algebra, Convex Optimization, Statistical Decision Theory - Regression, Classification, Bias Variance, Linear Regression, Multivariate Regression, Subset Selection, Shrinkage Methods, Principal Component, Regression, Partial Least squares, Linear Classification, Logistic Regression, Linear Discriminant Analysis, Perceptron, Support Vector Machines

2 **Neural Networks:**

Neural Networks - Introduction, Early Models, Perceptron Learning, Back-propagation, Initialization, Training & Validation, Parameter Estimation - MLE, MAP, Bayesian Estimation, Decision Trees, Regression Trees, Stopping Criterion & Pruning loss functions, Categorical Attributes, Multi-way, Splits, Missing Values, Decision Trees - Instability Evaluation Measures

3 **Bootstrapping & Cross Validation:**

Bootstrapping & Cross Validation, Class Evaluation Measures, ROC curve, MDL, Ensemble Methods - Bagging, Committee Machines and Stacking, Boosting, Gradient Boosting, Random Forests, Multi-class Classification, Naive Bayes, Bayesian Networks

4 **Undirected Graphical Models:**

Undirected Graphical Models, HMM, Variable Elimination, Belief Propagation, Partition Clustering, Hierarchical Clustering, Birch Algorithm, CURE Algorithm, Density-based Clustering

5 **Gaussian Mixture Models:**

Gaussian Mixture Models, Expectation Maximization, Learning Theory, Introduction to Reinforcement Learning, Optional videos (RL framework, TD learning, Solution Methods, Applications)

Text Books

1. Introduction to Machine Learning, Third Edition, Ethem Alpaydın, PHI, ISBN No. 978-81-203- 5078-6.
2. Understanding Machine Learning (From Theory to Algorithms), First Edition, Shaishalev-Shwartz and Shai Ben-David, Cambridge University Press, ISBN No. 978-1-107-51282-5.

Refernce Books

1. Pattern Recognition and Machine Learning, Christopher M. Bishop, McGraw-Hill, ISBN No. 0- 07-115467-1.
2. Machine Learning, First Edition, Tom Mitchell, McGraw-Hill, ISBN No. 0-07-115467-1.
3. Deep Learning (Adaptive Computation and machine Learning Series), Ian Goodfellow and Yoshua Bengio, Massachusetts London, England, ISBN No. 9780262035613.

E Books/ Online learning material

1. https://nptel.ac.in/courses/106/106/106106139/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1												1		
CO 2	2												1		
CO 3	2	1											1		
CO 4	2	2	2		2			1	1				1	2	2
CO 5	2	1											1		

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	-	-	-	-	-
ISE II* 20 Marks	-	-	-	-	5
ESE Assessment 60 Marks	-	-	-	-	-

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	-	-	-
K2	Understand	-	-	-
K3	Apply	-	-	-
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		0	0	0

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPEC2006 : Big Data Analytics		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understand the concepts of Big data and challenges in processing Big Data.

CO2: Understand Hadoop architecture and eco-system.

CO3: Gain conceptual understanding of Hadoop Distributed File System.

CO4: Understand the concepts of map and reduce and functional programming

CO5: Identify appropriate techniques and tools to solve actual Big Data problems.

Course Contents

Unit No	Detailed Contents
1	**Introduction To Big Data And Hadoop:** Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Info sphere Big Insights and Big Sheets.
2	**HDFS (Hadoop Distributed File System):** The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.
3	**Map Reduce:** Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.
4	**Hadoop Ecosystem And Yarn:** Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features Name Node High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.
5	**HIVE & HIVEQL, HBASE:** Hive Architecture and Installation, Comparison with Traditional Database, HiveQL – Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

Text Books

1. Hadoop: The Definitive Guide, Third Edition, Tom White, O'reily Media, 2012.
2. Big Data Analytics: Seema Acharya, Subhasini Chellappan, Wiley 2015.

Refernce Books

1. Professional Hadoop Solutions, Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Wiley, ISBN: 9788126551071, 2015.
2. Understanding Big data,Chris Eaton, Dirk deroos et al. , McGraw Hill, 2012.
3. Big Data Analytics with R and Haoop,Vignesh Prajapati, Packet Publishing 2013.

E Books/ Online learning material

1. https://onlinecourses.nptel.ac.in/noc20_cs92/preview
2. https://onlinecourses.swayam2.ac.in/arp19_ap60/preview
3. https://onlinecourses.nptel.ac.in/noc22_cs65/preview

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1														1
CO 2	1														1
CO 3	1	1	2										2	1	
CO 4	1	1	2										1	1	
CO 5	1	2	2					1	1	1			2	1	1

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	5	5	5	-
ISE II* 20 Marks	5	-	5	5	5
ESE Assessment 60 Marks	24	24	6	6	-

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	10	10	24
K2	Understand	10	5	24
K3	Apply	-	5	12
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPEC2007 : Mobile Technology		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understanding concepts of Mobile Communication.

CO2: Analyse 2G,3G,4G Mobile Communication Architectures.

CO3: Apply the principles and theories of mobile computing technologies.

CO4: Understand Android and start creating an application.

CO5: Design and develop various mobile Android applications.

Course Contents

Unit No	Detailed Contents
1	**Mobile Communications: An Overview :** Concept of Mobile Communication, Different generations of wireless technology, Mobile Computing Architecture (3 tier), Mobile system Networks: Cellular Networks and Frequency Reuse, Mobile Smartphones, Smart Mobiles and Systems, Handheld Devices, Smart Systems, Limitations of Mobile Devices.
2	**2G,3G,4G Communication Architectures :** GSM Services and Architecture, Localization, Call Handling, Handover, GPRS, Analogue & digital modulations and multiple access Techniques- SDMA, FDMA, TDMA, Spread Spectrum, CDMA, Long-term Evolution, Handover Scenarios, LTE Integration with IMS, WLAN, Wi-Fi, Wi-Max,
3	**Mobile Adaptive Computing :** Characteristics of Mobile Communication, Application of Mobile Communication, Security Concern Related to Mobile Computing, Middleware and Gateway required for mobile Computing, Making Existing Application Mobile Enable, Mobile IP, Basic Mobile Computing Protocol, Mobile Communication via Satellite • Low orbit satellite • Medium orbit satellite • Geo stationary satellite Satellite phones.
4	**Introduction to Android :** Overview of Android, What does Android run On – Android Internals?, Android for mobile apps development, Environment setup for Android apps Development, Framework – Android SDK, Eclipse, Emulators – What is an Emulator / Android AVD? Android Emulation – Creation and set up, First Android Application
5	**Exploring Android Studio :** Anatomy of an Android application, A basic Activity project, Android Views and its properties, adding views to an activity, Exploring Android UI design, UI Layouts, adding views to GridLayout , Android Styles and Themes, Android Custom Components, The Android Studio Designer.

Text Books

1. Professional ANDROID 4 Application Development, Reto Meier, WROX publication.
2. Mobile Computing Technology, Applications and Service Creation, 2nd Edition, Asoka. K Talukder and Roopa R. Yavagal, Tata McGraw hill

Refernce Books

1. Android Studio Development Essentials,Neil Smyth.
2. The Definitive Guide to SQL Lite, Michael Owens, 2nd A press Berkeley, CA, USA 2010
3. Beginning Android Mark, 1st edition, L Murphy, Wiley India Pvt. Ltd
4. Professional Android to Application Development,1st edition, Sayed Y Hashimi and Satya Komatineni, Wiley India Pvt. Ltd
5. Fundamentals of Mobile and Pervasive Computing, 3rd Edition, Frank Adelsteinm Tata McGraw Hill

E Books/ Online learning material

1. https://nptel.ac.in/courses/106/106/106106147/
2. http://pl.cs.jhu.edu/oose/resources/android/Android-Tutorial.pdf
3. https://www.tutlane.com/tutorial/ios/ios-tutorial

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1		1							1					
CO 2	1	2	1							1			1		
CO 3	1	2						1		1			1		
CO 4	1	3			2				1	1		1	1		
CO 5	1	3	3		3				1	1		1	1	2	2

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	5	5	5	-
ISE II* 20 Marks	5	5		5	5
ESE Assessment 60 Marks	10	10	15	10	15

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	5	18
K2	Understand	5	5	24
K3	Apply	10	10	18
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPEC2008 : Block Chain		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understanding the basic fundamentals of Block chain.

CO2: Understanding the concept of Bit Coin Block chain and its use cases.

CO3: Implement cryptographic algorithms for security.

CO4: Comprehend Alternative Coins and Smart Contracts.

CO5: Understand Hyperledger Framework and explore Corda Blockchain.

Course Contents

Unit No	Detailed Contents
1	**Introduction:** Basic ideas behind Blockchain, how it is changing the landscape of digitalization, introduction to cryptographic concepts required, Hashing, public key cryptosystems, private vs. public, Blockchain and use cases, Hash Puzzles, Introduction to Bitcoin Blockchain
2	**Bitcoin Blockchain and scripts:** Use cases of Bitcoin Blockchain scripting language in micropayment, escrow etc Downside of Bitcoin – mining: Mining explained, The Bitcoin network, The Bitcoin Mining Process, Mining Developments
3	**Asymmetric key cryptography:** AES structure, Analysis of AES , Key distribution Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Analysis of RSA, Diffie-Hellman Key exchange
4	**Alternative coins:** Ethereum and Smart contracts,Alternative coins – Ethereum continued, IOTA, The real need for mining – consensus – Byzantine Generals Problem, and Consensus as a distributed coordination problem – Coming to private or permissioned block chains
5	**Hyper ledger:** Introduction to Hyper ledger, Permissioned Blockchain and use cases – Hyper ledger, Corda Uses of Blockchain in E-Governance, Land Registration, Medical Information Systems and others.

Text Books

1. Mastering Bitcoin: Unlocking Digital Crypto currencies, Andreas Antonopoulos
2. Bitcoin and Crypto currency Technologies: A Comprehensive Introduction, Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Princeton University Press (July 19, 2016).

Approved in XXVIth Academic Council
Dated: 27th April 2023

Refernce Books

1. Bitcoin: A Peer-to-Peer Electronic Cash System, Satoshi Nakamoto.
2. Blockchain Applications: A Hands-on Approach, Arshdeep Bahga and Vijay K. Madisetti.
3. A survey of attacks on Ethereum smart contracts, Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli.
4. Mastering Bitcoin: Programming The Open Blockchain, Andreas M. Antonopoulos, O'Reilly Publication.
5. Blockchain: Ultimate Beginner's Guide to Blockchain Technology- Crypto currency, Smart Contracts, Distributed Ledger, Fintech, and Decentralized Applications, Matthew Connor Kindle Edition, 2017

E Books/ Online learning material

1. https://nptel.ac.in/content/syllabus_pdf/106104220.pdf
2. https://www.coursera.org/courses?query=blockchain&page=1
3. https://www.hyperledger.org/projects/fabric

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1											1	1		
CO 2	2											1	1		
CO 3	2	1	2					3				1	1		
CO 4	2	2	2	1	2			1	1	1		1	1	2	2
CO 5	2	1					1				2	1	1		

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	5	5	5	-
ISE II* 20 Marks	-	5	5	5	5
ESE Assessment 60 Marks	10	15	10	10	15

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	5	18
K2	Understand	10	10	24
K3	Apply	5	5	18
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPEC2009: Cloud Computing		
Teaching Scheme	**Examination Scheme**	
Lectures : 04 Hrs/Week	ISE I*	20 Marks
Tutorial :	ISE II*	20 Marks
Credits : 04	End Semester Examination	60 Marks

Course Outcome - After studying this course, students will be able to

CO1: Understanding cloud architecture, services and management.

CO2: Understanding virtualization, security and storage in cloud computing.

CO3: Learn the Concept of Cloud Infrastructure Model with respect to different service providers

CO4: Analyze different security issues and challenges in cloud computing.

CO5: Develop an application using cloud technology for realizing real life scenarios.

Course Contents

Unit No	Detailed Contents

1 **Basics of Cloud Computing:**
Historical development- Distributed system, Virtualization. Web 2.0, Service-oriented computing, Utility-oriented computing**Glance of cloud computing-** definitions, overview, application, benefits and limitations of cloud computing. **Cloud Computing services model-** Application development, Infrastructure and system development, Computing platforms and technologies,SaaS, PaaS, IaaS, Storage **Cloud Architecture-** Infrastructure organization and Logical organization ,Private, Public, and Hybrid cloud model.

2 **Virtualization:**
Implementation Levels of Virtualization, Virtualization, Structures/Tools and Mechanisms Types of Hypervisors, Virtualization in physical and logical devices, Virtual Clusters and Resource Management, Virtualization for Data-Centre Automation. Common Standards: The Open Cloud Consortium, Open Virtualization Format, Standards for Application Developers: Browsers (Ajax), Data (XML, JSON), Solution Stacks (LAMP and LAPP), Syndication (Atom, Atom Publishing Protocol, and RSS), Standards for Security.

3 **Data storage and data security in cloud:**
Cloud file system- GFS, HDFS [big table, D/base, dynamo], **Direct attached data storage and cloud storage-** NAS Devices, storage Redundancy, technology used in data storage such as distributed grid in cloud computing. **Cloud storage management -** characteristics and technologies such as through LAN and WAN **Data security and its mechanism-** cloud-based solutions, understanding the treads, business continuity and disaster recovery.

4 **Cloud Service Providers:**
Amazon Web Services-Elastic Compute Cloud (EC2) [Simple Storage Service (S3), Simple Queue Service (SQS)], Elastic Block Storage (EBS), Elastic Load Balancing (ELB), [Simple DB, Relational Database Service (RDS)], Virtual Amazon Cloud, Google- App Engine [Google Storage, Google Kubernetes engine] Windows Azure, Rack space Cloud.

5   **Latest/advance techniques in Cloud computing:**
     Energy efficient cloud - energy efficient devices and green cloud computing
     architecture, **The future cloud -** tv applications, devices, house-based
     applications, market-based applications, business-based applications. **Automatic
     cloud engine -** Jungle Computing, Distributed Cloud Computing Vs Edge
     Computing, Containers, Docker, and Kubernetes, Introduction to DevOpps. **Case
     studies**.

Text Books
1. Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more, Dr. Kris Jamsa, Wiley
   Publications.
2. Cloud Computing: Principles and Paradigms, 1st Edition, Rajkumar Buyya, James
   Broberg, Andrzej Goscinski, Wiley Publication

Refernce Books
1. Cloud Computing Insight into New-Era Infrastructure, 1st Edition, Dr. Kumar
   Saurabh, Wiley India Pvt. Ltd
2. Cloud Computing: A Practical Approach, Anthony T. Velte, Tata McGraw Hill, 2009
3. Guide to Cloud Computing: Principals and Practices, 1st Edition, Richard Hill,
   Laurie Hirsch, Peter Lake, Siavash Moshiri, Springer
4. Enterprise Cloud Computing, 1st Edition, Gautam Shroff, Cambridge
5. Cloud Security and Privacy, 1st Edition, Tim Mather, Subra K, Shahid L., Oreilly

E Books/ Online learning material
1. http://nptel.ac.in/courses/106106129/28
2. https://cloudacademy.com/courses/
3. http://scpd.stanford.edu/search/publicCourseSearchDetails.do?method=load&
   courseId=11815

Mapping of COs and POs

PO→ CO↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2													
CO 2	1	2													
CO 3	1	2													1
CO 4	1	2	3										2	1	
CO 5	1	2	3		2			1	1	1			2	1	

Assessment Table

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
ISE I* (Class Test) 20 Marks	5	-	5	5	5
ISE II* 20 Marks	5	-	5	5	5
ESE Assessment 60 Marks	12	12	12	6	18

Assessment Pattern

Level No.	Knowledge Level	ISE I*	ISE II*	End Semester Examination
K1	Remember	5	5	24
K2	Understand	5	10	24
K3	Apply	10	5	12
K4	Analyze	-	-	-
K5	Evaluate	-	-	-
K6	Create	-	-	-
Total		20	20	60

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPCC2010: Lab: Adv. Java		
Teaching Scheme	**Examination Scheme**	
Practicals : 04 Hrs / week	ISE I*	**50 Marks**
Credits : 02	**End Semester Examination**	**25 Marks**

Course Outcome - After studying this course, students will be able to

CO1: Develop Database & its related Operations using Servlet.

CO2: Implement the advanced environment using Hibernate, Struct, Spring in their Application

CO3: Develop a mini project using layered MVC Architecture

Course Contents (Indicative List of Experiments not restricted to)

1. Write a program for creating mini chat application using socket programming.
2. Write a program for Addition and Subtraction using concept of RMI programming
3. Write a program to implement CRUD operation in JDBC
4. Create Exam Registration Form using JDBC Connectivity
5. Write a program for creating Edit menu for Notepad using Frame
6. Write a program for creating simple Servlet with JDBC.
7. Create an employee information form by using JSP
8. Write a program for implementing concept of MVC Architecture.
9. Write a program for implementing concept of Hibernate, Stuct, Spring
10. Write a program for implementing concept of Maven Project
11. Write a program for implementing concept of Web Service
12. Write a program for implementing concept of J-Unit Testing.
13. Write a program for implementing concept of JAXB

Mapping of COs and POs

PO→ CO↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	1	2								1	2	
CO2	1	2	2	1	2								1	2	
CO3	1	2	2	1	2			1	2	2			1	2	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	**Imitation**	**15**	**18**
S2	**Manipulation**	**15**	**07**
S3	**Precision**	**10**	**05**
S4	**Articulation**	**10**	**05**
S5	**Naturalization**	**-**	**-**
Total		**50**	**25**

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCPCC2011: Lab: ASP .Net and C#		
Teaching Scheme	**Examination Scheme**	
Practicals : 02 Hrs/Week	ISE I*	**25 Marks**
Credits : 01	**End Semester Examination**	**25 Marks**

Course Outcome - After studying this course, students will be able to

CO1: Create and connect with Database using ASP.NET & SQL Server
CO2: Implement web services using AJAX.
CO3: Develop a mini project using ASP.Net Framework.

Course Contents (Indicative List of Experiments not restricted to)

1. To Study the ASP.Net Framework
2. To Study & Create Presentation Layer using HTML & CSS
3. To Study & Create Master Page, User Control etc
4. To Study & Use Standard Controls in ASP.NET
5. To Study & Use Validation Controls in ASP.NET
6. To Study, Create and Connect with Database using ASP.NET & SQL Server
7. To Study & Implement Web Services
8. To Study & Implement AJAX in ASP.NET
9. To Study & Deploy Project on IIS
10. Mini Project

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	1	2								1	2	
CO2	1	2	2	1	2								1	2	
CO3	1	2	2	1	2			1	2	2			1	2	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	08	08
S2	Manipulation	07	07
S3	Precision	05	05
S4	Articulation	05	05
S5	Naturalization	-	-
Total		**25**	**25**

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on the following◆

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

Approved in XXVIth Academic Council
Dated: 27th April 2023

MCAEC2012 : Seminar		
Teaching Scheme	**Examination Scheme**	
Practicals : 02 Hrs/Week	ISE I*	**50 Marks**
Credits : 01	**End Semester Examination**	-

Course Outcome - After studying this course, students will be able to

CO1: Develop and support a relevant and informed thesis, or point of view, that is appropriate for its audience, purpose, discipline, and theme.

CO2: Demonstrate effective writing skills and processes by employing the rhetorical techniques of academic writing, including invention, research, critical analysis and evaluation, and revision.

CO3: Incorporate and document appropriate sources in accordance with the formatting style proper for the discipline and effectively utilize the conventions of standard written English.

Course Contents (Indicative List of Experiments not restricted to)

The aim of the seminar is to make the students study something extra other than curriculum. They are expected to go through the latest trend pertaining to computer and allied fields and deliver the seminar by preparing report.

The other important aim of the seminar is to encourage and develop the personality, aptitude and knowledge of the students.

Mapping of COs and POs

PO→ CO↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2		1		1		1		3	1	1	1	1	
CO 2	1	2		1		1		1		3	1	1	1	1	
CO 3	1	2		2		1		1		3	1	1	1	1	

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	15	-
S2	Manipulation	10	-
S3	Precision	-	-
S4	Articulation	10	-
S5	Naturalization	15	-
Total		50	-

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on

1. Performance in the practical examination.

2. Record of programs submitted by the candidate.

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCPRJ2013: Minor Project		
Teaching Scheme	**Examination Scheme**	
Practicals : 04 Hrs/Week	ISE I*	50 Marks
Credits : 02	End Semester Examination	25 Marks

Course Outcome - After studying this course, students will be able to

CO1: Demonstrate the ability to manage a project including planning, scheduling and risk assessment/management individually or in group.

CO2: Demonstrate to work as professionals with portfolios ranging from data management, network configuration, software design, management and administration of entire system.

CO3: Demonstrate proficiency in rapid software development techniques on regular basis.

CO4: Demonstrate technical report writing skills for the project apart from development and presentation.

Course Contents

- The project batches of 2-3 students should be formed, which will work on the project allocated by the department. Term work submission should be done in the form of a joint report. The term work assessment will be done jointly by teachers appointed by Head of the Institution. The oral examination will be conducted by an internal and external examiner as appointed by the Institute.
- Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
- The mid-term evaluations should be done, which includes presentations and demos of the work done.
- Project report should be of 35 to 40 pages (typed on A4 size sheets). For standardization of the project reports the following format should be strictly followed.
- **Format of Project Report-**
  - **Page Size:** Trimmed A4
  - **Top Margin:** 1.00 Inch
  - **Bottom Margin:** 1.32 Inches
  - **Left Margin:** 1.5 Inches
  - **Right Margin:** 1.0 Inch
  - **Para Text:** Times New Roman 12 Point Font
  - **Page Numbers:** Right Aligned at Footer. Font 12 Point. Times New Roman
  - **Headings:** Times New Roman, 14 Point Bold Face
  - **Certificate:** All students should attach standard format of Certificate as described by the department. Certificate should be awarded to batch and not to individual student. Certificate should have signatures of Guide, Head of Department and Principal/ Director.
  - **Index of Report:**
    - Title Sheet
    - Certificate
    - Acknowledgement
    - Table of Contents
    - List of Figures
    - List of Tables
  - **References:** References should have the following format
    - For Books: "Title of Book", Authors, Publisher, Edition
    - For Papers: "Title of Paper", Authors, Journal/Conference Details, Year

Approved in XXVIth Academic Council
Dated: 27th April 2023

Mapping of COs and POs

PO → / CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2	3	1	2	1	1	1	2	1	1	1	2	2	1
CO 2	2	2	3	1	2	1			2	1	1	1	2	2	1
CO 3	2	2	3	1	2	1			2	2	1	1	2	3	1
CO 4	2	2	3	1	2	1			2	2	1	1	2	2	1

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	-	-
S2	Manipulation	10	5
S3	Precision	10	5
S4	Articulation	10	5
S5	Naturalization	20	10
Total		50	25

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council

MCINT2014 : Internship / On Job Training		
Teaching Scheme	**Examination Scheme**	
Practicals : 40 Hrs/Week	ISE I*	100 Marks
Credits : 20	End Semester Examination	100 Marks

Course Outcome - After studying this course, students will be able to

CO1: Demonstrate the ability to manage a project including planning, scheduling and risk assessment/management individually or in group.

CO2: Demonstrate to work as professionals with portfolios ranging from data management, network configuration, software design, management and administration of entire system.

CO3: Demonstrate proficiency in rapid software development techniques on regular basis.

CO4: Demonstrate technical report writing skills for the project apart from development and presentation.

Course Contents

- The project work to be carried out individually which commences in the Semester IV as per the project assigned to the each individual by the respective industry. It shall include the problem definition, literature survey, approaches for handling the problem, finalizing the methodology for the project work and system design etc.
- Term work submission should be done in the form of an individual report. Assessment of the term work will be done by the internal guide. The oral examination will be conducted by an internal and external examiner as appointed by the Institute.
- Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
- The mid-term evaluations should be done, which includes presentations and demos of the work done.
- Project report should be of 35 to 40 pages (typed on A4 size sheets). For standardization of the project reports the following format should be strictly followed.
- **Format of Project Report-**
  - **Page Size:** Trimmed A4
  - **Top Margin:** 1.00 Inch
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  - **Para Text:** Times New Roman 12 Point Font
  - **Page Numbers:** Right Aligned at Footer. Font 12 Point. Times New Roman
  - **Headings:** Times New Roman, 14 Point Bold Face
  - **Certificate:** All students should attach standard format of Certificate as described by the department. Certificate should be awarded to batch and not to individual student. Certificate should have signatures of Guide, Head of Department and Principal/ Director.
  - **Index of Report:**
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Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	2	3	1	2	1	1	1	2	1	1	1	2	2	1
CO 2	2	2	3	1	2	1			2	1	1	1	2	2	1
CO 3	2	2	3	1	2	1			2	2	1	1	2	3	1
CO 4	2	2	3	1	2	1			2	2	1	1	2	2	1

Assessment Table

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	-	-
S2	Manipulation	20	20
S3	Precision	20	20
S4	Articulation	20	20
S5	Naturalization	40	40
Total		100	100

Assessment

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.

Approved in BoS meeting held on 24/08/2023 and Approved by Chairman, Academic Council