FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A++" Grade by NAAC (4th Cycle)
Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT : **DEPARTMENT OF MCA**

NAME OF THE PROGRAMME : **MCA**

PROGRAMME CODE : **MCA**

ACADEMIC YEAR : **2023 – 2024**

FATIMA COLLEGE(AUTONOMOUS), MADURAI

DEPARTMENT OF MCA

To be implemented From : 2023 - 2024 onwards
Venue : SJ 16
Convened on : 03.04.2023
Convened at : 10 a.m.

Members Present

S.NO.	NAME	DESIGNATION
1.	Ms. S. Mary Helan Felista	Head of the Department
2.	Dr. S. Kannan Professor, Dept. of Computer Applications. School of IT Madurai Kamaraj University Madurai	University Nominee
3.	Dr. Sr. R. Shantha Mary Joshitta Head & Asst. professor Dept. of Computer Science Jeyaraj Annapackiam College for Women Periyakulam	Subject Expert
4.	Dr. S. R. Raja Associate Professor Dept. of Comp. Sc. & Applns. Saveetha University Chennai	Subject Expert

5.	Mr. Antony S. Raj Vice President 5G Business Tech. Leader Jio Platforms Limited Mumbai	Industrialist
6.	Ms. V. Nandhini Front End Developer Mindzen India Pvt. Ltd. chennai	Alumna
7.	Dr. S. Raju	Director
8.	Dr Sangeetha	Dean of Academic - Affairs
9.	Dr. R. Smeeta Mary	Faculty
10.	Ms. S. Jeba Priya	Faculty
11.	Ms. B. Usha	Faculty
12	Ms. S. Selvarani	Faculty
13.	Ms. P. Nancy Vincentina Mary	Faculty

ACTION TAKEN REPORT FOR 2022-2023

S.NO.	Common Suggestions offered in the Previous Board	Action taken for the academic year 2022 - 2023
1.	Courses offered in the final semester can be offered in the previous semesters to facilitate project cum placement	Online classes were conducted for the courses offered in the final semester.

CHANGE OF COURSE TITLE : NIL

NEW COURSES INTRODUCED

S.NO.	COURSE CODE	COURSE TITLE	RELEVANCE L R N G	SCOPE EMP/ENT /SD	NEED FOR INTRODUCTION
1.	22MCA102	Relational Database Management System	Global	EMP	To meet the industry requirements
2.	22MCA302	Software Engineering Principles	Global	SD	Advanced software engineering practiced in the industry to be imparted
3.	22MCA401	UIX Design Programming	Global	SD	Career opportunities in UIX design rapidly increasing.

REVISED COURSES

S. No.	Course Code	Course Title	No. & Title of Units Revised	% of Revision	Need for Revision	Relev. LRNG	Scope
1.	20MCA 101	Mathematical Foundation of Comp. Science	Unit V - Trees Properties of Trees Spanning Trees	10%	Trees to be included in Graph Theory	G	SD
2.	20 MCA 104	Programming in Python	Unit V - Exception handling.	20%	concepts more detailed	G	EMP
3.	20 MCA 202	Web Technologies	Unit I	20%	Basics moved to Bridgecourse	G	EMP
4.	20MCA 203	Programming in Java	Unit I & II Rearranged	20%	Topics re-aligned for easy learning	G	EMP
5.	20MCA 304	Enterprise Application Development	Unit II - Spring, & Hibernate Framework	20%	Topics revamped to facilitate Learning	G	EMP
6.	20MCA GE11	Cloud Computing	Unit I - V	20%	Topics revamped for easy learning	G	SD

MINUTES - 2023 ONWARDS

1. Updation of Open Educational Resources in the list of references of each course (if needed)

NIL

3. Revision of Courses

Revised Courses

S.NO.	Course Code	Course Title	No. & Title of Units Revised	% of Revision	Need for Revision	Relevance Revision L R NG	Scope
1.	20MCA 103	Operating System	Unit III, IV & V Revamped	20%	To enhance conceptual learning	Global	SD
2.	23MCA 104	Programming in Python	All the units	60%	To meet the Industry standards	Global	EMP
3.	23MCA 203	Programming in Java	Unit IV & V	30%	To include industry ready topics	Global	SD
4.	23MCA AM03	Machine Learning	Unit III, IV & V	30%	To include tools	Global	SD
5.	20MCA AL01	Internet of Things	Unit V	20%	Facilitate easy learning	Global	SD
6.	20MCA DA03	Big Data Analytics	Unit III, IV & V	20%	Facilitate easy learning	Global	SD
7.	23MCA 102	RDBMS	Unit III, IV & V	50%		Global	EMP
8.	20MCA AM01	Artificial Intelligence & Expert System	Unit V	20%	of the concepts	Global	SD

* 1 General Elective Course to be offered as Self learning course in the final semester.

4. New Courses Introduced :

New Courses Introduced

S. No.	Course Code	Course Title	Relevance to LRNG	Scope EMP/ENTRE/SD	Need for Introduction
1.	23MCA 202	Computer Networks & Communication	Global	SD	Networking concepts to be included in the core
2.	23MCA 303 & 23MCA305	Full Stack Development (Theory & Lab)	Global	EMP	Essential for Placements.
3.	23 MCA 304 & 23MCA306	Application Development Frameworks (Theory & Lab)	Global	EMP	MVC concept is the need from the industry
4.	23 MCA DS01	Distributed Systems	Global	SD	Knowledge on distributed system essential for the specialization
5.	23MCA DS02	Secured Wireless Communication	Global	SD	To include the security aspects of wireless communication
6.	23MCA DS06	Web Security	Global	SD	Security aspects of database & web for specialization needed

S. No.	Course Code	Course Title	Relevance L R N G	Scope	Need for Introduction
7.	23 MCA GE01	E- Content Development	Global	SD	E-content creation is becoming the trend
8.	23MCA GE08	Principles of Artificial Intelligence	Global	SD	Basics of EAI to be offered
9.	23 MCA GE11	Cloud Services	Global	SD	cloud computing as in the industry
10.	23 MCA GE13	Internet & Web Designing	Global	EMP	Theory concepts of web programming to be included
11.	23 MCA GE14	Foundation of Data Science	Global	SD	Basics of Data science to be offered
12.	23 MCA GE15	High Speed Networking Principles	Global	SD	Recent networking architecture to be included
13.	23MCA 307	Skill Based Lab III Mobile App. Dev.	Global	SD	Recent Trend

* 20 MCA 401 — Final (IV) Semester to be dedicated for Major Project.

* Bridge courses are offered at the beginning of each semester pertaining to the requirements

5. Introduction of Purely Skill Embedded certificate / Diploma / Advanced Diploma value added courses other than the value added courses that is already being offered

S.NO.	Course Code	Course Title	MOU WITH INDUSTRY	SKILLS Sharpened	Course Outcome
1.	23PGVA MCA05	Software Testing Tools		Software Testing	1. To impart knowledge on the need for testing 2. To give an indepth knowledge on Selenium. 3. To introduce testing frameworks
2.	23PGVA MCA06	Web Designing Using JSP & Servlets		Web Application Development	1. To create website using Java Servlets 2. To develop web application using JSP

6. Approval of Ph.D Course Work Syllabus NIL

7. Rubrics for Internship / Project

S.NO.	C1 (50 Marks)	C2 (50 Marks)	External (100 MKS)
1.	Literature Survey	Coding	Novelty & Functionality
2.	Modularity	Algorithms	Presentation & Queries

Details of Proposed / Signed MOUS

1. The Department of MCA propose to extend the MOU with Bricksteel Enterprises InfoTech Pvt. Ltd., Bangalore for the following activities
   - → Inplant Training
   - → Placement
   - → Skill embedded Value added course
   - → Guest Lectures
   - → FDP

2. The Department propose to extend the MOU with Vivara Tech, Chennai for e-content development.
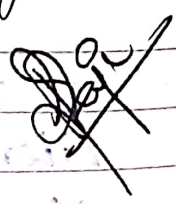
3. The Department has planned to sign more MOUS in the upcoming year.

OTHER SUGGESTIONS
1. Networking concepts to be offered as a core paper
2. Operating System course to include advance concepts
3. Python course to include more of array concepts.
4. Machine Learning Course to include clustering concepts.
5. Base papers of Specialization electives to be offered as General electives.

COMMENDATIONS
1. Syllabus is highly enriched according to the requirements and trends of the industry.

S. No.	Name	Signature
1.	Dr. S. Raju Director, Professional Courses	

		Signature
1.	Ms. S. Mary Helan Felista	S. Helan
2.	Dr. S. Kannan	S. Kannan 3/4/23
3.	Dr. Sr. R. Shantha Mary Joshitta	SMJ 3/4/23
4.	Dr. S. R. Raja	S.R.Raja
5.	Mr. Antony S. Raj	Absent
6.	Ms. V. Nandhini	Absent
7.	Dr. Sangeetha	Sangeetha
8.	Dr. R. Smeeta Mary	Smeeta
9.	Ms. S. Jeba Priya	S.Jeba
10.	Ms. B. Usha	Usha.B
11.	Ms. S. Selvarani	Selvarani
12.	Ms. P. Nancy Vincentina Mary	P. Nancy

03/04/2023

VISION

Being women of communion, contemplative and prophetic, empower women and children through faith formation and value-based education for societal equality, harmony and to care for our common home.

MISSION

To energize Women and Children towards Academic excellence through Quality Education. To endow them with character, competence, creativity & commitment. To enkindle in them inclusive love, building fraternal communities and stand for the cause of those at the periphery with compassion.

VISION OF THE DEPARTMENT

To Empower women by providing them unique learning experience with ethical values in computer applications to meet the industrial standards and societal expectations.

MISSION OF THE DEPARTMENT

➢ Training in the cutting edge technologies to adapt to the Dynamic IT world

➢ Promoting a learning community in a supportive and caring environment that lead students to successfully complete their goals

➢ Build up Leadership traits among students

➢ Craft responsible Computer Professionals with strong Moral Values

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1	**Subject Proficiency -** Our graduates will be academic, digital and information literates, creative, inquisitive, innovative and desirous for the "more" in all aspects
PEO 2	**Professional Growth -** They will be efficient individual and team performers, exhibiting progress, flexibility, transparency and accountability in their professional work
PEO 3	**Managerial Skills** - The graduates will be effective managers of all sorts of real – life and professional circumstances, making ethical decisions, pursuing excellence within the time framework and demonstrating apt leadership skills
PEO 4	**Needs of the Society-** They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.

PROGRAMME OUTCOMES (PO)

The learners would be able to

PO 1	Apply the knowledge of computing maths and science for the solution of problems and requirements
PO 2	Identify, critically analyze, formulate and develop computer applications using fundamental principles of relevant domain disciplines
PO 3	Design and evaluate solutions for computer based problems to meet the desired needs within realistic constraints such as safety, security and applicability
PO 4	Use research based knowledge to conduct experiments and interpret data to attain well-defined conclusions.
PO 5	Create, select and apply modern computing tools by understanding the limitations, with dexterity.
PO 6	Demonstrate the competency in programming skills as per industry expectations.
PO 7	Understand the impact of system solutions in societal, environmental and cultural issues within local and global contexts for sustainable development
PO 8	Commit to professional ethics and cyber regulations, responsibilities & norms.
PO 9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary environment to manage projects.
PO 10	Communicate effectively with the society about computing technologies.
PO 11	Demonstrate knowledge and understanding of the management principles and apply these to manage projects.

PO 12	Appreciate the importance of goal setting and to recognize the need for life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSO)

On completion of MCA programme, the graduates would be able to

PSO 1	Ability to design and develop applications in the computing discipline to meet the customer's business objectives.
PSO 2	Ability to Integrate various system components to provide user interactive solutions for various challenges
PSO 3	Ability to test and maintain the software applications with latest computing tools and technologies.
PSO 4	Ability to understand the evolutionary changes in the practices and strategies in software project development.
PSO 5	Ability to enhance teamwork and leadership skills to solve time critical problems

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
SEMESTER – I						
20MCA101	Mathematical Foundation of Computer Science	4	4	50	50	100
23MCA102	Relational Database Management System	4	4	50	50	100
20MCA103	Operating Systems	4	4	50	50	100
23MCA104	Programming in Python	4	4	50	50	100
*	Elective I – Specialization	4	4	50	50	100
23MCA105	Lab I - RDBMS	6	3	50	50	100
23MCA106	Lab II – Python Programming	6	3	50	50	100
20MCA107	Skill Based Lab I–Linux	2	1	25	25	50
20MCA108	Soft Skills I- Professional Communication	2	2	25	25	50
20MCA109	Comprehensive Viva - I	-	1	-	50	50
	Total Credits		**30**			**850**
SEMESTER – II						
20MCA201	Data Structures and Algorithms	4	4	50	50	100
23MCA202	Computer Networks & Communication	4	4	50	50	100
23MCA203	Programming in Java	4	4	50	50	100
*	Elective II – Specialization	4	4	50	50	100
*	Elective I – General	4	4	50	50	100
20MCA204	Lab III – Web Technologies	6	3	50	50	100
23MCA205	Lab IV- Java Programming	6	3	50	50	100
20MCA206	Skill Based Lab II - R Programming	2	1	25	25	50
20MCA207	Soft Skills II- Aptitude Training	2	2	25	25	50

20MCA208	Comprehensive Viva - II	1	1	-	50	50
	Total Credits		**30**			**850**
20MCA301	Internship & Mini Project	-	6	50	50	100
22MCA302	Software Engineering Principles	4	4	50	50	100
23MCA303	**Full Stack Development**	**4**	**4**	**50**	**50**	**100**
23MCA304	**Application Development Frameworks**	**4**	**4**	**50**	**50**	**100**
*	**Elective III– Specialization**	4	4	50	50	100
*	**Elective II-General**	4	4	50	50	100
23MCA305	**Lab V - Full Stack Development**	**6**	**3**	**50**	**50**	**100**
23MCA306	**Lab VI - Application Development Frameworks**	**6**	**3**	**50**	**50**	**100**
23MCA307	**Skill Based Lab III – Mobile Application Development**	**2**	**1**	**25**	**25**	**50**
20MCA308	Soft Skill III- Interpersonal Skills for Corporate Readiness	2	2	25	25	50
20MCA309	Comprehensive Viva - III	-	1	-	50	50
	Total Credits		**36**			**950**
*	**Elective III – General (Self Learning)**	4	4	50	50	100
20MCA401	Project *Viva Voce*	-	12	100	100	200
	Total Credits		**16**			**300**
	Total Credits		**112**			**2950**

ELECTIVES

SPECIALIZATION ELECTIVE – DATA ANALYTICS

S.NO	SEMESTER	COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	I	20MCADA01	Data Mining Techniques	4	4	50	50	100
2.	I	20MCADA02	Data Analytics and Visualization using Spreadsheets	4	4	50	50	100
3.	II	20MCADA03	Big Data Analytics	4	4	50	50	100
4.	II	20MCADA04	Data Analytics Tools & Techniques	4	4	50	50	100
5.	III	20MCADA05	Business Analytics Using R	4	4	50	50	100
6.	III	20MCADA06	Big Data Security	4	4	50	50	100

SPECIALIZATION ELECTIVE – DISTRUIBUTED SYSTEM SECURITY

S.NO	SEMESTER	COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	I	23MCADS01	Distributed Systems	4	4	50	50	100
2.	I	23MCADS02	Secured Wireless Communication	4	4	50	50	100
3.	II	20MCADS03	Cryptography & Network Security	4	4	50	50	100
4.	II	20MCADS04	Cyber Forensics	4	4	50	50	100
5.	III	20MCADS05	Cloud Security	4	4	50	50	100
6.	III	23MCADS06	Web Security	4	4	50	50	100

SPECIALIZATION ELECTIVE – AI & MACHINE LEARNING

S.NO	SEMESTER	COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	I	20MCAAM01	Artificial Intelligence & Expert System	4	4	50	50	100
2.	I	20MCAAM02	Soft Computing	4	4	50	50	100
3.	II	23MCAAM03	Machine Learning	4	4	50	50	100
4.	II	20MCAAM04	Neural Networks	4	4	50	50	100
5.	III	20MCAAM05	Human Computer Interaction	4	4	50	50	100
6.	III	20MCAAM06	Deep Learning	4	4	50	50	100

GENERAL ELECTIVES

S.NO	COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	23MCAGE01	E Content Development	4	4	50	50	100
2.	20MCAGE02	Financial Management and Accounting	4	4	50	50	100
3.	20MCAGE03	Organizational Behaviour	4	4	50	50	100
4.	20MCAGE04	E-Commerce	4	4	50	50	100
5.	20MCAGE05	Ethics in Computing	4	4	50	50	100
6.	20MCAGE06	Resource Management Techniques	4	4	50	50	100
7.	20MCAGE07	Entrepreneurship Development	4	4	50	50	100
8.	23MCAGE08	Principles of Artificial Intelligence	4	4	50	50	100
9.	20MCAGE09	Research Methodology	4	4	50	50	100
10	20MCAGE10	Digital Image Processing	4	4	50	50	100
11	23MCAGE11	Cloud Services	4	4	50	50	100
12	20MCAGE12	Agile Software Engineering	4	4	50	50	100
13	23MCAGE13	Internet & Web Designing	4	4	50	50	100
14	23MCAGE14	Foundation of Data Science	4	4	50	50	100
15	23MCAGE15	High Speed Networking Principles	4	4	50	50	100

EXTRA CREDIT COURSES (FOR ADVANCED LEARNERS)

Course. Code	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
20MCAAL01	INTERNET OF THINGS (Self Learning Course))	-	2	IV	50	50	100
	MOOC COURSES / International Certified online Courses(Department Specific Courses/any other courses) * Students can opt other than the listed course from UGC-SWAYAM /UGC /CEC	-	Minimum 2 Credits	I - IV	-	-	-

INTERDISCIPLINARY EXTRA CREDIT COURSES

(FOR ADVANCED LEARNERS- (For MBA students)

Course. Code	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
21MCA2SL	INFORMATION TECHNOLOGY FOR MANAGEMENT (Self Learning Course))	-	4	I-II	50	50	100
21MCA4SL	WEB ANALYTICS (Self Learning Course))	-	4	III-IV	50	50	100

I MCA

SEMESTER – I

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCA102	RELATIONAL DATABASE MANAGEMENT SYSTEMS	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides knowledge on different issues involved in the design of a database system and it Provide strong foundation of database concepts and to introduce students to application development in DBMS.

COURSE OBJECTIVE

❖ The course describes the data, organizing the data in database, database administration..

❖ To study the physical and logical database designs, integrity and normalization.

❖ It also gives introduction to SQL language to retrieve the data from the database with suitable application development.

UNIT – I INTRODUCTION   **(12 Hours)**

Database system applications - Purpose of Database Systems - View of data - Database languages – Relational Databases - Database design –Data Storage and Querying – Transaction Management – Database Architecture - Data

Mining and Information Retrieval- Specialty Databases - Database Users and administrators - Introduction to Relational Model -Structure of Relational

Databases - Database Schema – Keys – Schema Diagrams- Relational query languages.
SELF STUDY: Relational Operations.

UNIT- II RELATIONAL DATABASE DESIGN   (12 Hours)

Formal Relational Query Languages - Relational Algebra - The Tuple relational calculus - Domain relational calculus - Database design and the E-R Model - The Entity-Relationship Model- Constraints – Entity-Relationship Diagrams - Extended E-R features - Atomic Domains and First Normal form-Decomposition using Functional dependencies - Decomposition Using Multivalued Dependencies
SELF STUDY: Entity-Relationship Design Issues.

UNIT - IIIPOSTGRESQL BASICS   (12 Hours)

What is PostgreSQL? – History – Features – Database Administration – Advantages and Disadvantages – Database – Connect - Create - Select -Drop – Data types
SELF STUDY: Select

UNIT - IV POSTGRESQL – TABLE   (12 Hours)

Create Table- Drop Table - Schema - Insert Query - Select Query - Operators - Expressions - Where Clause - AND & OR Clauses- Update Query-Delete Query- Like Clause- Limit Clause - Order By Clause - Group By - With Clause- Having Clause - Distinct Keyword.
SELF STUDY:AND & OR Clauses

UNIT- V ADVANCEDPOSTGRESQL   (12 Hours)

Constraints- Joins - Unions Clause - NULL Values - Alias Syntax - Triggers-Indexes - Alter Table Command - Truncate Table Command - Views - Transactions - Locks - Sub Queries - Auto Increment - Privileges - Date/Time Functions & Operators - Functions - Useful Functions

SELF STUDY: Auto Increment

REFERENCE BOOKS

1. Abraham Silberschatz, Henry F. Korth, S.Sudarshan, "Database System Concepts" ,Tata McGraw Hill publishers, 6th Edition, 2018.
2. Hans-Jürgen Schönig, "Mastering PostgreSQL 12", Packt Publishing, Limited, 3rd Edition, 2019.
3. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Pearson Education, Seventh Edition, 2017.
4. Dimitri Fontaine, "Mastering PostgreSQL in Application Development", Lulu.com, 2017.

WEB RESOURCES

1. https://www.tutorialspoint.com/postgresql/index.htm
2. https://www.w3schools.com/postgresql/index.php
3. http://www.ss64.com/ora/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	Database system Applications & Purpose	1	Chalk & Talk	Black Board
1.2	Relational Databases	2	Chalk & Talk	Black Board
1.3	Transaction Management	1	Lecture	PPT
1.4	Database Architecture	1	Chalk & Talk	Black Board
1.5	Database Users and administrators	2	Discussion	Black Board
1.6	Structure of Relational Databases	2	Lecture	White board
1.7	Database Schema Diagrams	1	Discussion	Google classroom
1.8	Relational query languages & operations	2	Lecture	White board
UNIT - 2 RELATIONAL DATABASE DESIGN				
2.1	Formal Relational QueryLanguages	1	Lecture	PPT
2.2	The Tuple relational calculus	2	Chalk & Talk	Black Board
2.3	Domain relational calculus	2	Lecture	PPT
2.4	Database design &the E-R Model	2	Lecture	White board
2.5	Expression Trees	1	Discussion	Black Board
2.6	The E-R Model & Diagrams	1	Chalk & Talk	Black Board

2.7	First Normal form	1	Chalk & Talk	Black Board
2.8	Decomposition Using functional and Multi-valued Dependencies	2	Lecture	PPT
UNIT – 3POSTGRESQL BASICS				
3.1	What is PostgreSQL?	1	Lecture	White board
3.2	History – Features	1	Chalk & Talk	Black Board
3.3	Database Administration	2	Lecture	PPT
3.4	Advantages and Disadvantages	1	Lecture	White board
3.5	Database	1	Discussion	Google classroom
3.6	Connect	1	Lecture	PPT
3.7	Create	1	Chalk & Talk	Black Board
3.8	Select	2	Lecture	White board
3.9	Drop – Data types	2	Chalk & Talk	Black Board
UNIT – 4POSTGRESQL – TABLE				
4.1	Create Table- Drop Table	1	Lecture	PPT
4.2	Schema	2	Lecture	PPT
4.3	Insert Query	1	Chalk & Talk	Black Board
4.4	Select Query	2	Chalk & Talk	Black Board
4.5	Operators- Expressions - Where Clause	1	Discussion	Black Board

4.6	AND & OR Clauses- Update Query	1	Lecture	PPT
4.7	Delete Query- Like Clause- Limit Clause	2	Chalk & Talk	Black Board
4.8	Order By Clause- Group By - With Clause- Having Clause - Distinct Keyword	2	Lecture	PPT
UNIT – 5ADVANCED POSTGRESQL				
5.1	Constraints - Joins - Unions Clause	1	Chalk & Talk	Black Board
5.2	NULL Values - Alias Syntax	2	Lecture	PPT
5.3	Triggers- Indexes	2	Lecture	PPT
5.4	Alter Table Command - Truncate Table Command	2	Lecture	White board
5.5	Views - Transactions - Locks	2	Lecture	White board
5.6	Sub Queries - Auto Increment	1	Lecture	White board
5.7	Privileges - Date/Time Functions & Operators	1	Lecture	White board
5.8	Functions - Useful Functions	1	Discussion	Class Room

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholasti	5
	50

✓ **All the course outcomes are to be assessed in the various CIA components. The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :K2**-*Understand***, K3**-*Apply***, K4**-*Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**   **Nos**

C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- **TheAverage of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the basic concepts of Relational Data Model, EntityRelationship Model and process of Normalization.	K2, K4	PSO1 & PSO 2
CO 2	Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	K2, K3, K4	PSO2 & PSO4
CO 3	Understand the basics and construct database in PostgreSQL.	K2 , K4	PSO1 & PSO3
CO 4	Master writing queries and SQL statements to operate PostgreSQL.	K2, K3,K4& K5	PSO2 & PSO4
CO 5	Understand and use built-in functions and enhance the knowledge of handling multiple tables	K2,K3,K4& K5	PSO 4 & PSO 5

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	1	3	1	2	1
CO3	2	1	3	1	1
CO4	1	2	1	3	1
CO5	1	1	1	2	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

Mapping of C0s with POs
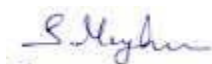
CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	2	1	2	1	1	2	1	3	2
CO2	1	3	2	1	3	2	2	2	1	2	1	1
CO3	1	1	3	2		3	3	1	1	2	1	2
CO4	3	2	2	1	3	1	1	1	2	3	2	1
CO5	1	2	1	1	2	1	2	1	1	1	3	1
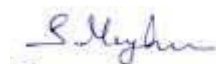
COURSE DESIGNER: **Forwarded By**

S. MARY HELAN FELISTA   **HOD'S Signature & Name**

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I MCA

SEMESTER – I

(For those who join in 2023 onwards)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCA104	PROGRAMMING IN PYTHON	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides the basics of writing and running Python scripts to more advanced features such as file operations, regular expressions, working with OOPs concept and using the extensive functionality of Python modules. Extra emphasis is placed on features unique to Python, such as tuples, array slices, and output formatting.

COURSE OBJECTIVE

- ❖ To differentiate syntax of Python from other programming languages.
- ❖ To get familiar in writing simple programs using Python language.
- ❖ To understand various data structures provided by Python library including string, List.
- ❖ To build real-world applications using OOPs, Files and Exception handling.

UNIT – I INTRODUCTION   (12 Hours)
Basics of Python Programming

Features – Writing First Python Program – Constants – Variables – Data Types – Input Operation – Operators – Expression – Strings – Type Conversions.

Decision Control Statements

Selection Statements – Basic Loop Structures – Nested Loops – The break Statement – The continue Statement – the pass Statement – the else Statement used with loops.

SELF STUDY : Type Conversions

UNIT - II FUNCTIONS & STRINGS   (12 Hours)

Functions and Modules

Function Definition – Function Call – Variable Scope – The return Statement – Lambda Functions – Recursive Functions – Modules – Packages – Standard Library Modules.

Strings

String Operations – Strings are Immutable – String Formatting Operator – Built-in String Methods – Slice Operation – String Module – Regular Expressions.

SELF STUDY : Variable Scope

UNIT - III File Handling & Data Structures   (12 Hours)

File Handling

File path – Types of Files – Opening and Closing files – Reading and Writing files – File positions – Renaming and Deleting files – Directory Methods.

Data Structures

Sequence – Lists – List Operations – List Methods – Tuple – Tuple Operations – Tuple methods – Sets – Dictionaries – Dictionary Opearations- Dictionary Functions – List vs Tuple vs Dictionary vs Set.

SELF STUDY : List vs Tuple vs Dictionary vs Set

UNIT - IV OBJECT ORIENTED FEATURES   (12Hours)

Classes and Objects

Classes and Objects – Self Argument – Constructor – Special Methods – Public and Private Data Members – Private Methods- Built-in Functions – Built-in Class Attributes – Class Methods – Static Methods

Inheritance

Inheriting Class in Python – Types of Inheritance – Composition – Abstract Classes and Interfaces.

SELF STUDY : Private Methods

UNIT - V ERROR AND EXCEPTION HANDLING   (12 Hours)

Operator Overloading

Implementing Operator Overloading – Reverse Adding – Overriding – Overloading Miscellaneous Functions.

Error and Exception Handling

Introduction – Handling Exceptions – Multiple Except Blocks – The else clause – Raising Exception – The finally Block.

REFERENCES:
1. Reema Thareja, "Python Programming", Oxford University Press, 2017
2. Richard L. Halterman, "Learning To Program with Python", 2013.
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", Course Technology Inc; 2nd Edition, 2018
4. Allen B. Downey, "Python for Software Design", 2018.
5. Bill Lubanovic, "Introducing Python", O 'Reilly Media Publications, 2015

WEB REFERENCES:
1. http://spoken-tutorial.org/tutorial-search/python
2. https://docs.python.org

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT 1 Introduction			
1.1	**Basics of Python Programming** Features – Writing First Python Program	2	PPT	LCD
1.2	Constants – Variables	1	PPT	LCD
1.3	Data Types – Input Operation	2	Flipped Classroom	LCD
1.4	Operators – Expression – Strings – Type Conversions.	2	PPT	LCD
1.5	Selection Statements – Basic Loop Structures – Nested Loops	1	Group Discussion	White Board
1.6	The continue Statement – the pass Statement	2	Flipped Classroom	LCD
1.7	The else Statement used with loops.	2	PPT	LCD
UNIT 2 Functions & Strings			
2.1	Function Definition – Function Call.	1	Flipped Classroom	LCD
2.2	Variable Scope – The return Statement	1	Lecture	White Board
2.3	Lambda Functions – Recursive Functions	1	PPT	White Board

2.4	Modules – Packages – Standard Library Modules0	1	Flipped Classroom	LCD
2.5	String Operations – Strings are Immutable	2	PPT	LCD
2.6	String Formatting Operator	2	PPT	LCD
2.7	Built-in String Methods – Slice Operation	2	Self Study	Presentation using PPT
2.8	String Module – Regular Expressions.	2	PPT	LCD
UNIT 3 File Handling & Data Structures				
3.1	File path – Types of Files – Opening and Closing files	2	Flipped Classroom	LCD
3.2	Reading and Writing files – File positions	2	PPT	White Board
3.3	Renaming and Deleting files – Directory Methods	2	PPT	LCD
3.4	Sequence – Lists – List Operations – List Methods	2	PPT	LCD
3.5	Tuple – Tuple Operations – Tuple methods – Sets – Dictionaries	2	Chalk and Talk	Blackboard
3.6	Dictionary Opearations- Dictionary Functions – List vs Tuple vs Dictionary vs Set	2	PPT	LCD
UNIT 4 Object Oriented Features				
4.1	Classes and Objects – Self Argument – Constructor	2	Chalk and Talk	Blackboard
4.2	Special Methods – Public and Private Data Members	2	Chalk and Talk	Blackboard

4.3	Private Methods- Built-in Functions – Built-in Class Attributes – Class Methods – Static Methods	2	Chalk and Talk	Blackboard
4.4	Inheriting Class in Python	2	Flipped Classroom	LCD
4.5	Types of Inheritance – Composition	2	PPT	LCD
4.6	Abstract Classes and Interfaces	2	PPT	LCD
UNIT 5 Error and Exception Handling				
5.1	Implementing Operator Overloading	2	Flipped Classroom	LCD
5.2	Reverse Adding	1	Flipped Classroom	LCD
5.3	Overriding	2	Lecture	PPT
5.4	Overloading Miscellaneous Functions	1	PPT	White Board
5.5	Introduction – Handling Exceptions	2	Demonstration	LCD
5.6	Exceptions – Multiple Except Blocks	1	PPT	White Board
5.7	The else clause – Raising Exception	2	Demonstration	White Board
5.8	The finally Block.	1	Lecture	PPT

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholastic	5
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

  K2-Understand*,* *K3*-Apply*,* *K4*-Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

                                                    Nos

C1 – Test (CIA 1)   2*   -   10 Mks

C2 - Test (CIA 2)   1   -   15 Mks

C3 - Assignment / Open Book Test   2   -   10 Mks

C4 - Seminar   1   -   10 Mks

C5 - Attendance   1   -   5 Mks

- **•The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Predict the basics of Python programming.	K2, K4	PSO1& PSO2
CO 2	Solve problems requiring the writing of well-documented programs in the Python language, including use of the logical constructs of that language&Formulate solutions for String	K2, K3, K4	PSO2& PSO3
CO 3	Use and manipulate File operations and python data structures.	K2 , K4	PSO3&PSO4
CO 4	Apply object-oriented programming concepts to develop dynamic interactive Python applications.	K2, K3,K4 & K5	PSO1&PSO4
CO 5	Formulate exception handling model to develop robust programs.	K2,K3,K4 & K5	PSO4&PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	3	1	1
CO2	1	2	3	1	1
CO3	3	1	1	1	1
CO4	1	1	1	3	2
CO5	1	1	3	2	1

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**
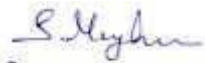
♦ Weakly Correlated -**1**

Mapping of COs with Pos

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	2	3	3	1	1	3	1	2
CO2	1	2	2	2	3	2	2	3	1	2	2	2
CO3	1	3	1	2	2	3	3	1	3	3	2	1
CO4	2	2	3	1	1	1	2	1	2	2	2	2
CO5	1	2	3	1	1	3	2	2	2	1	1	2

COURSE DESIGNER:

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I MCA

SEMESTER – I

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCA105	LAB I – RDBMS	MAJOR LAB	6	3

COURSE DESCRIPTION

This course provides practical knowledge in PL/SQL programming, utilizing the services provided by Oracle database in a stored procedure perspective. This also includes implementation of Subprograms, Triggers, and Cursor concepts in depth.

COURSE OBJECTIVE

❖ To give a good formal foundation on the relational model of data

❖ To present the techniques relating to query processing by SQL engines.

❖ To develop PL/SQL programs with stored procedures, stored functions, cursors and packages.

LAB LIST

SQL QUERIES

1. DDL statements to Create, Alter, Drop, Truncate and rename tables.
2. DML statements to perform Select, Insert, Delete, Update on tables.
3. DCL statements to access database using Grant and Revoke.
4. TCL statements to work on Commit, Rollback and Save point.
5. SQL queries to implement Where, Like, Order By, Group By, Having clauses.
6. SQL queries to implement arithmetic, Logical, Concatenation and Quote operators.
7. SQL queries to implement mathematical functions. (count, minimum value, maximum value, sum, average, First and Last)

8. SQL queries to implement scalar functions. (UCASE, LCASE, MID, ROUND)
9. SQL queries to implement Set Operations. (Intersect, Union, Union All, Minus)
10. SQL queries to implement column and table level constraints.(NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY, CHECK and DEFAULT)
11. SQL queries to perform Natural, Inner, Outer, Left, Right and Equi Joins.
12. SQL queries to implement subqueries and nested queries.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Enhance Programming skills and techniques.	K2	PSO1, PSO2 & PSO3
CO 2	Formulate complex queries using SQL	K2, K3, K4	PSO1 & PSO2
CO 3	Use Cursors, Triggers and PL/SQL code constructs using Procedures & Functions	K2, K3& K5	PSO4 & PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	1	1
CO2	2	3	1	1	1
CO3	1	1	1	3	2

Mapping of COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	2	2	2	1	2	1	2
CO2	3	1	2	1	3	2	2	3	1	2	1	2
CO3	3	2	3	2	2	3	2	3	2	2	1	3

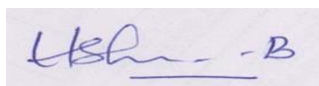**Note**: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

B.USHA   **HOD'S Signature & Name**

I MCA

SEMESTER – I

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	23MCA106	LAB II – PYTHON PROGRAMMING	MAJOR LAB	6	3

COURSE DESCRIPTION

This course provides the practical knowledge of implementing Python programs with loops, functions and represent compound data using lists, tuples and dictionaries.

COURSE OBJECTIVES

❖ To write, test and debug simple Python programs.

❖ To use functions for structuring Python programs.

❖ To read and write data from/to files in Python.

LAB LIST

1. Running instructions in Interactive interpreter and a Python Script.
2. Write a program to purposefully raise Indentation Error and correct it.
3. Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
4. Write a program using arrays.
5. Write a program using for loop that loops over a sequence.
6. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
7. Write a program to count the numbers of characters in the string and to use split and join methods in the string.

8. Write a program combine lists that combines these lists into a dictionary.

9. Write a function nearly equal to test whether two strings are nearly equal.Two strings a and b are nearly equal when a can be generated by a single mutation on b.

10. Write a function reverse to reverse a list. Without using the reverse function.

11. Write a program using built in functions

12. Write a program to implement dictionary operations.

13. Write a program to implement Tuple operations.

14. Write a program to implement Exception Handling

15. Find the most frequent words in a text read from a file.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Implement Math functions, Strings, List and Tuple in Python programs.	K2	PSO1, PSO2 & PSO3
CO 2	Express different Decision Making statements and Functions.	K2, K3, K4	PSO3 & PSO4
CO 3	Interpret Object oriented programming in Python & File handling operations.	K2, K3 & K5	PSO4 & PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	3	1	1
CO2	1	1	2	3	1
CO3	1	1	1	2	2

Mapping of COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	2	2	2	1	2	1	2
CO2	3	1	2	1	3	2	2	3	1	2	1	2
CO3	3	2	3	2	2	3	2	3	2	2	1	3

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

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I MCA

SEMESTER – II

(For those who join in 2023 onwards)
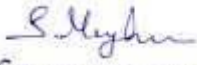
PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	23MCA202	COMPUTER NETWORKS &COMMUNICATION	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides the basic concepts, design principles and underlying technologies of networking.

COURSE OBJECTIVE

❖ To familiarize with the basic taxonomy & terminology of data communication.

❖ To analyze the function & design strategies of Physical, Datalink, Network and Transport layer.

❖ To acquire the basic knowledge of various Application protocols.

UNIT – I (12 Hours)

INTRODUCTION

Introduction: Data Communications – Networks – Network Types - Network Models -Protocol Layering - OSI Model- Layers in the OSI model - TCP/ IP protocol suite – Addressing

SELF STUDY: Network Types

UNIT – II (12 Hours)

PHYSICAL LAYER MEDIA & DATA LINK LAYER

Transmission Media- Introduction- Guided Media- Unguided Media.

Switching – Circuit switched Network- Datagram Network- Virtual Circuit Network

Error detection and Correction- Introduction- Block Coding

Data link Control -DLC Services - Framing- - Data Link Layer Protocols- Noiseless Channels- Noisy Channels

SELF STUDY: Error detection and Correction

UNIT – III   (12 Hours)

NETWORK LAYER & TRANSPORT LAYER

Network Layer - Internet Protocol –Datagram Format - IPV4- IPV6- Transition from IPV4 to IPV6 - Routing: Unicast Routing Protocols

Transport Layer Protocols -Introduction - UDP – TCP – SCTP.

SELF STUDY: Transition from IPV4 to IPV4

UNIT –IV   (12 Hours)

APPLICATION LAYER

Domain Name System- Name Space- Domain Name Space- Distribution of Name Space **-** DNS in the Internet **-** DNS Messages– Types of records **-** Resolution **-** Remote Login

Remote Logging, Electronic Mail and File Transfer- Remote Logging – Email - FTP

SELF STUDY: Remote Login – Email

UNIT –V   (12 Hours)

COMPUTER NETWORK SECURITY PROTOCOLS

Introduction – Application Level Security – PGP – S/MIME – S-HTTP – SET – Kerberos – Security in the Transport Layer – SSL – TLS – Security in the Network Layer – IPSec – VPN – Security in the Link Layer – PPP – RADIUS – TACSCS

SELF STUDY: Security in the Transport Layer

REFERENCES:

1. Behrouz A Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw Hill.
2. Joseph MiggaKizza, " A Guide to Computer Network Security", Springer International Publishing, 2020
3. Andrew. S. Tanenbaum, "Data Communication and Networking", 4th Edition, Pearson Education.
4. Ertaul, Levent, "Computer Network Security Essentials", Springer International Publishing, 2017

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1. http://www.omnisecu.com/basic-networking/
2. https://www.geeksforgeeks.org/network-security/
3. https://www.ibm.com/docs/en/SSLTBW_2.2.0/com.ibm.zos.v2r2.halz002/security_protocols.htm

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-1 OVERVIEW				
1.1	Introduction: Data Communications	2	Chalk & Talk	Black Board
1.2	Networks - Network Types	2	Chalk & Talk	Black Board
1.3	Network Models - Protocol Layering	2	Chalk & Talk	Black Board
1.4	OSI Model - Layers in the OSI model	3	Chalk & Talk	Black Board
1.5	TCP/ IP protocols suite	2	Lecture	White board
1.6	Addressing	1	Chalk & Talk	Black Board
UNIT 2 PHYSICAL LAYER MEDIA & DATA LINK LAYER				
2.1	Transmission Media - Introduction- Guided Media- Unguided Media	2	Chalk & Talk	Black Board
2.2	Switching - Circuit switched Network	1	Lecture	PPT
2.3	Datagram Network - Virtual Circuit Network	2	Lecture	White board
2.4	- Error detection and Correction Introduction- Block Coding	1	Discussion	Black Board
2.5	Data link Control- Framing- Flow and Error control	1	Chalk & Talk	Black Board

2.6	Protocols - Noiseless Channels	2	Chalk & Talk	Black Board
2.7	Protocols – Noisy Channels	3	Lecture	White board
UNIT 3 NETWORK LAYER& TRANSPORT LAYER				
3.1	Network Layer - Internet Protocol- Datagram Format - IP V4	1	Lecture	White board
3.2	IP V6– Transition from IP V4 to IP V6	1	Chalk & Talk	Black Board
3.3	Routing - Unicast Routing Protocols	3	Lecture	PPT
3.4	Transport Layer – Introduction - Process-to-Process delivery	1	Chalk & Talk	Black Board
3.6	UDP	2	Lecture	PPT
3.7	TCP	2	Chalk & Talk	Black Board
3.8	SCTP	2	Chalk & Talk	Black Board
UNIT 4 APPLICATION LAYER				
4.1	Domain Name System :Name Space	1	Chalk & Talk	Black Board
4.2	Domain Name Space	1	Lecture	PPT
4.3	Distribution of Name Space	1	Lecture	PPT
4.4	DNS in the Internet	1	Lecture	White board
4.5	DNS Messages– Types of records	1	Lecture	White board
4.6	Resolution	2	Lecture	White board

4.7	Remote Login	1	Lecture	White board
4.8	Remote Logging, Electronic Mail and File Transfer: Remote Logging	1	Chalk & Talk	Black Board
4.9	Email, FTP	3	Lecture	White board
UNIT 5 COMPUTER NETWORK SECURITY PROTOCOLS				
5.1	Introduction – Application Level Security	2	Chalk & Talk	Black Board
5.2	PGP – S/MIME – S-HTTP	2	Lecture	PPT
5.3	SET – Kerberos – Security in the Transport Layer – SSL – TLS	2	Lecture	PPT
5.4	Security in the Network Layer – IPSec – VPN	2	Lecture	PPT
5.5	Security in the Link Layer – PPP	2	Lecture	PPT
5.6	RADIUS – TACSCS	2	Demonstration	White board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5= 10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholastic	5
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

   K2-Understand*,*   *K3*-Apply*,*   *K4*-Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

                                                   Nos

C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the functionalities of Networking layers of both OSI and TCP/IP reference models.	K2, K4	PSO1 & PSO2
CO 2	Analyze the design issues of Datalink layer and techniques to resolve it.	K2, K3, K4	PSO2 & PSO3
CO 3	Compare the principles of Internet protocols and Routing algorithm. Predict the TCP and UDP related procedures	K2 , K4	PSO3
CO 4	Outline the Application layer protocols.	K2, K3,K4 & K5	PSO1 & PSO4
CO 4	Examine and Explore Network Security Protocols	K2,K3,K4 & K5	PSO4

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	1	3	2	1	1
CO3	3	1	3	1	1
CO4	2	1	1	3	1
CO5	1	1	1	3	1

Note: ɸ Strongly Correlated – **3**   ɸ Moderately Correlated – **2**

ɸ Weakly Correlated -**1**

Mapping of COs with POs
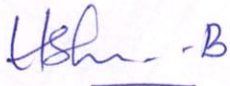
CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
CO1	3	3	1	2	2	3	3	1	1	3	1	2
CO2	1	2	2	2	3	2	2	3	1	2	3	2
CO3	1	3	1	2	2	3	3	1	3	3	2	3
CO4	2	2	3	3	1	1	2	1	2	2	2	2
CO5	1	2	3	1	1	3	2	2	2	2	1	2
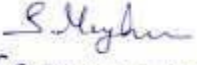
COURSE DESIGNER: **Forwarded By**

B.USHA   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)

I MCA

SEMESTER – II

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCA203	PROGRAMMING IN JAVA	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides an exhaustive coverage of Core Java programming language features like OOPS and GUI programming.

COURSE OBJECTIVE

❖ To understand the basic Java programming constructs

❖ To develop program by using OOPS concept.

❖ To handle Packages, Exception , Basics of AWT

❖ To create and manipulate databases in Java using JDBC

❖ To Gain a knowledge on the web development frameworks of Java

UNIT – I   **(12 Hours)**

INTRODUCTION TO OOP IN JAVA

An overview of Java – Object Oriented Programming –Introduction to classes – Class fundamentals – Declaring object – Introducing Methods - Constructors– The this keyword- Methods and Classes – Overloading Methods and Constructors – Object as Parameter – Argument passing – Returning objects.

SELF STUDY: Methods and Classes

UNIT – II   **(12 Hours)**

INHERITANCE, PACKAGESAND INTERFCES

Inheritance Basics – Using Super – Creating a Multilevel Hierarchy - Method Overriding –Dynamic Method Dispatch – Abstract Classes – Final with Inheritance

Packages - Access protection – Importing Packages

Interfaces – Default Interface Methods – Static methods in an Interface.

SELF STUDY: Static methods in an Interface

UNIT - III   **(12 Hours)**

EXCEPTION HANDLING AND THREADS

Exception Handling fundamentals - Exception Types – Uncaught Exceptions - Using try and catch – Multiple catch – Nested try statements – Built-in Exceptions.

Multithreaded Programming – Java Thread Model – Main Thread - Creating a Thread – Creating Multiple Threads –Using isAlive() and join() - Thread Priorities – Synchronization – Inter-thread communication – Suspending, Resuming and Stopping Threads.

SELF STUDY: Built-in Exceptions

UNIT – IV   **(12 Hours)**

AWT CLASSES AND CONTROLS & JDBC

AWT classes – Window fundamentals – Frame windows – Creating Windowed program –AWT Control fundamentals - Labels – Buttons – Checkbox – Choice control – Lists – Scroll Bars – Text Field - Text Area –Layout Managers - Menu bars and Menus – Dialog boxes.

Introduction to JDBC – Installing JDBC – Basic JDBC Programming Concepts

SELF STUDY: Layout Managers

UNIT – V   **(12 Hours)**

WEB DEVELOPMENT USING JAVA

SPRING - Spring framework-Advantages of Spring Framework -Spring Modules-Steps to create spring application-Spring MVC CRUD Example.

STRUTS– Introduction – Features - MVC framework – STRUTS architecture.

HIBERNATE - Introduction - Hibernate Framework -Advantages of Hibernate Framework -Hibernate Architecture - Steps to create Hibernate Application.

SELF STUDY: Spring MVC CRUD Example

REFERENCES:
1. Herbert Schildt, "JAVA the Complete Reference",9th Edition, Tata McGraw Hill,2016
2. Jim Keogh, "The Complete Reference J2EE", 3rd Edition, Tata McGraw Hill, Reprint 2010.
3. Ken Arnold, David Holmes, James Gosling,"The JAVA Programming Language", 3rd Edition, PrakashGoteti.
4. Christian Bauer, Gavin King, and Gary Gregory, Java Persistence with Hibernate, Second Edition, Manning Publications Co, 2019
5. Craig Walls, Spring in Action, Fifth Edition, Manning Publications,2018

WEB REFERENCES:
1. https://www.cs.cmu.edu/afs/cs.cmu.edu/user/gchen/www/download/java/LearnJava.pdf
2. https://lecturenotes.in/subject/73/java-programming-java

COURSE CONTENTS AND LECTURE SCHEDULE :

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO OOP IN JAVA				
1.1	An overview of Java – Object Oriented Programming	2	Chalk & Talk	Black Board
1.2	Introduction to classes – Class fundamentals	3	Chalk & Talk	Black Board
1.3	Declaring object – Introducing Methods	2	Discussion	PPT
1.4	Constructors– The this keyword	2	Chalk & Talk	Black Board
1.5	Methods and Classes – Overloading Methods and Constructors	1	Lecture	Black Board
1.6	Object as Parameter – Argument passing	1	Discussion	White board
1.7	Returning objects	1	Lecture	PPT
UNIT - 2 INHERITANCE, PACKAGES AND INTERFACES				
2.1	Inheritance Basics – Using Super	2	Lecture	PPT
2.2	Creating a Multilevel Hierarchy - Method Overriding	2	Chalk & Talk	Black Board

2.3	Dynamic Method Dispatch – Abstract Classes - Final with Inheritance	2	Lecture	PPT
2.4	Packages - Access protection	2	Lecture	White board
2.5	Importing Packages - Interfaces	2	Discussion	Black Board
2.6	Default Interface Methods – Static methods in an Interface	2	Chalk & Talk	Black Board
UNIT – 3 EXCEPTION HANDLING AND THREADS				
3.1	Exception Handling fundamentals - Exception Types	1	Lecture	White board
3.2	Uncaught Exceptions - Using try and catch	1	Chalk & Talk	Black Board
3.3	Multiple Catch - Nested try statements	2	Lecture	PPT
3.4	Built-in Exceptions	1	Lecture	White board
3.5	Multithreaded Programming - Java Thread Model	1	Lecture	PPT
3.6	Main Thread - Creating a Thread	1	Discussion	PPT
3.7	Creating Multiple Threads –Using isAlive() and join()	2	Chalk & Talk	Black Board
3.8	Thread Priorities – Synchronization - Inter-thread communication	2	Lecture	PPT
3.9	Suspending, Resuming and Stopping Threads.	1	Chalk & Talk	Black Board

	UNIT - 4 AWT CLASSES AND CONTROLS & JDBC			
4.1	AWT classes - Window fundamentals – Frame windows	2	Lecture	PPT
4.2	Creating Windowed program	1	Lecture	PPT
4.3	AWT Control fundamentals - Labels – Buttons	2	Chalk & Talk	Black Board
4.4	Checkbox - Choice control – Lists - Scroll Bars – Text Field - Text Area	2	Chalk & Talk	Black Board
4.5	Layout Managers - Menu bars and Menus – Dialog boxes	1	Discussion	Black Board
4.6	Introduction to JDBC - Installing JDBC	2	Lecture	PPT
4.7	Basic JDBC Programming Concepts	2	Chalk & Talk	Black Board
	UNIT – 5 WEB DEVELOPMENT USING JAVA			
5.1	Spring framework-Advantages of Spring Framework	2	Chalk & Talk	Black Board
5.2	Spring Modules-Steps to create spring application	2	Lecture	PPT
5.3	Spring MVC CRUD Example	2	Lecture	PPT
5.4	STRUTS – Introduction – Features - MVC framework – STRUTS architecture	2	Lecture	White board

5.5	HIBERNATE - Introduction - Framework -Advantages	2	Lecture	White board
5.6	Hibernate Architecture - Steps to create Hibernate Application	2	Lecture	White board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholastic	5
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

    K2-Understand,   *K3-Apply*,   *K4-Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

			Nos		
C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Analyse the hierarchy of java classes to develop object oriented programs.	K2, K4	PSO1 & PSO5
CO 2	Design software in Java using Packages and Interfaces	K2, K3, K4	PSO1& PSO2
CO 3	Develop programs for handling Exceptions & implementing Multithreading concepts	K2 , K4	PSO1 & PSO3
CO 4	Implement Concepts of AWT for Creating GUI and JDBC connectivity	K2, K3,K4 & K5	PSO3 & PSO4
CO 5	Explore the frameworks in Java and develop applications for the basic CRUD operation using frameworks	K2,K3,K4 & K5	PSO1&PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	1	1	1
CO2	3	2	1	1	1
CO3	2	1	3	1	1
CO4	1	1	2	3	1
CO5	2	1	1	1	3

Mapping of C0s with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	1	2	3	1	2	3	2	1
CO2	1	3	2	1	2	2	3	1	1	2	2	1
CO3	3	1	3	1	2	2	3	1	1	3	1	1
CO4	1	1	3	2	3	2	2	2	1	3	2	2
CO5	1	1	2	1	1	2	2	2	3	3	2	3

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER: **Forwarded By**

B.USHA   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)

I MCA

SEMESTER - II

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	23MCA205	LAB IV – JAVA PROGRAMMING	MAJOR LAB	6	3

COURSE DESCRIPTION

This course provides experiential learning in the implementation of Core Java Programming.

COURSE OBJECTIVE

❖ To understand the basic Java programming constructs.

❖ To develop program by using OOPS concept.

❖ To handle Packages, Exception, Basics of AWT and Applets.

❖ To create and manipulate databases in Java using JDBC.

LAB LIST

1. Programs using Basic Programming Constructs.
2. Programs implementing Classes.
3. Programs for implementing Inheritance.
4. Programs for implementing Abstract Classes.
5. Programs for implementing a Stack Class.
6. Programs for implementing Constructor Overloading.
7. Programs for implementing Method Overloading.
8. Programs for implementing Method Overriding.
9. Programs for Handling Errors using Exception Handling.
10. Programs using Interfaces.
11. Programs on Packages.
12. Programs on Multithreading.
13. Programs in Applets.
14. Programs for Designing Graphical User Interface using AWT.

15. Programs for Data Base Management Systems using JDBC.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand Java programming development environment, compiling, debugging, linking and executing a program..	K1	PSO1 & PSO3
CO 2	Analyze the complexity of problems, Modularize the problems into small modules and then convert them into programs.	K1 & K2	PSO2 & PSO3
CO 3	Understand and apply the in-built functions and customized functions for solving the problems	K1 & K3	PSO3 & PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	3	1	1
CO2	1	3	2	1	1
CO3	1	1	1	1	3

Mapping of COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1	1	1	1	1	1	1	2
CO2	3	2	3	2	3	1	1	1	1	1	2	2
CO3	3	3	3	3	3	1	1	1	1	1	1	2

Note: ɸ Strongly Correlated – **3**   ɸ Moderately Correlated – **2**

ɸ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

 S. JEBAPRIYA   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)

II MCA

SEMESTER – III

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCA303	FULL STACK DEVELOPMENT	CORE	4	4

COURSE DESCRIPTION

This course gives an Overview on complete designing of both websites and applications where the developers need to work from frontend to backend development.

COURSE OBJECTIVES

❖ To learn the core concepts of both the frontend and backend programming course. ·

❖ To get familiar with the latest web development technologies.

❖ Learn all about NOSQL databases.

❖ Learn complete web development process.

UNIT – I TAILWIND CSS

Introduction to Tailwind CSS - Installation and Setup of Tailwind CSS - Basic Utility Classes in Tailwind CSS - Responsive Design with Tailwind CSS - Layout Utilities - Tailwind CSS Effects - Tailwind Filters - State Variants and Pseudo-Classes - Advanced Utilities.

SELF STUDY: Tailwind Filters

UNIT - II INTRODUCTION TO REACT

Introduction - Features of React - ReactJS Lifecycle – React Environment Setup – Advantage of ReactJS – Disadvantage of ReactJS – JSX – Styling React Using CSS – React Components – React Props.

SELF STUDY: React Environment Setup

UNIT – III REACT JS FORMS & HOOKS

React Events – React Conditionals – React Lists - React State - Form Controls - Validating Forms - React Hooks - React useState Hook - React useEffect Hooks- React useContextHook - React Router.

SELF STUDY: React Hooks

UNIT – IV BACKEND

Client-Server Model - Creating Your Own Server - Creating an API - Connect Backend with HTML – GET & POST Method - Middleware - Send and Receive Data from React and Node - Axios Post Method.

SELF STUDY: GET & POST Method

UNIT – V MONGO DB

Introduction to Mongo DB - Create Database - Create Collection – Insert – Find – Query – Sort – Delete – Drop Collection -Update – Limit - Join – Integrate Mongo DB with React JS.

SELF STUDY: Limit

REFERENCES:

1. Alex Banks, Eve Porcello, "Learning React: Functional Web Development with React and Redux", O'Reilly Media, 1 edition, 2017.
2. Banks, Alex, and Eve Porcello, "Learning React: Modern Patterns for Developing React Apps.", O'Reilly Media, 2nd ed., 2020.
3. Bradshaw, Shannon, Eoin Brazil, and Kristina Chodorow, "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage", O'Reilly Media, 3rd ed., 2019.

WEB REFERENCES:

1. *https://nodejs.org/*
2. *https://reactjs.org/*
3. https://reactjs.org/docs/getting-started.html

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT 1 Tailwind CSS				
1.1	Introduction to Tailwind CSS	2	PPT	LCD
1.2	Installation and Setup of Tailwind CSS	2	PPT	LCD
1.3	Basic Utility Classes in Tailwind CSS	2	Flipped Classroom	LMS tool - and LCD
1.4	Responsive Design with Tailwind CSS - Layout Utilities	2	PPT	LCD
1.5	Tailwind CSS Effects - Tailwind Filters - State Variants and Pseudo-Classes	2	Group Discussion	White Board
1.6	Advanced Utilities	2	Flipped Classroom	LCD
UNIT 2 Introduction to React				
2.1	Introduction	1	Flipped Classroom	LCD

2.2	Features of React	1	Lecture	White Board
2.3	ReactJS Lifecycle	1	PPT	White Board
2.4	React Environment Setup	1	Flipped Classroom	LMS tool – and LCD
2.5	Advantage of ReactJS	2	PPT	CD
2.6	Disadvantage of ReactJS	2	PPT	LCD
2.7	JSX – Styling React Using CSS	2	Self Study	Presentation using PPT
2.8	React Components – React Props	2	PPT	LCD
UNIT 3 React JS Forms & Hooks				
3.1	React Events	2	Flipped Classroom	LCD
3.2	React Conditionals – React Lists	2	PPT	White Board
3.3	React State - Form Controls	2	PPT	LCD
3.4	Validating Forms - React Hooks	2	PPT	LCD
3.5	React useState Hook - React useEffect Hooks	2	Chalk and Talk	Blackboard
3.6	React useContextHook - React Router	2	PPT	LCD
UNIT 4 Backend				
4.1	Client-Server Model	2	Chalk and Talk	Blackboard
4.2	Creating Your Own Server	2	Chalk and Talk	Blackboard
4.3	Creating an API - Connect Backend with HTML	2	Chalk and Talk	Blackboard

4.4	GET & POST Method - Middleware	2	Flipped Classroom	LCD
4.5	Send and Receive Data from React and Node	2	PPT	LCD
4.6	Axios Post Method	2	PPT	LCD
UNIT 5 Mongo DB				
5.1	Introduction to Mongo DB	2	Flipped Classroom	LCD
5.2	Create Database	1	Flipped Classroom	LCD
5.3	Create Collection – Insert	2	Lecture	PPT
5.4	Find – Query	1	PPT	White Board
5.5	Sort – Delete	2	Demonstration	LCD
5.6	Drop Collection -Update	1	PPT	White Board
5.7	Limit - Join	2	Demonstration	LCD
5.8	Integrate Mongo DB with React JS	1	Lecture	PPT

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	**45**
Non Scholastic	**5**
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

   ***K2**-Understand**,** **K3**-Apply**,** **K4**-Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

			Nos		
C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- **•The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Utilize the conceptual and practical aspects of Bootstrap	K2, K4	PSO1& PSO2
CO 2	Design websites using various Angular features including directives, components and services	K2, K3, K4	PSO2& PSO3
CO 3	Analyze React Components, the building blocks and its interaction with other web applications	K2 , K4	PSO3&PSO4
CO 4	Compute and build applications using Node.JS	K2, K3,K4 & K5	PSO1&PSO4
CO5	Apply the concepts of MongoDB, the back-end databases	K2,K3,K4 & K5	PSO4&PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	3	1	1
CO2	1	2	3	1	1
CO3	3	1	1	1	1
CO4	1	1	1	3	2
CO5	1	1	3	2	1

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

Mapping of COs with Pos

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	2	3	3	1	1	3	1	2
CO2	1	2	2	2	3	2	2	3	1	2	2	2
CO3	1	3	1	2	2	3	3	1	3	3	2	1
CO4	2	2	3	1	1	1	2	1	2	2	2	2
CO5	1	2	3	1	1	3	2	2	2	1	1	2

COURSE DESIGNER: Forwarded By

S. Mary Helan Felista   HOD'S Signature & Name

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(S. MARY HELAN FELISTA)

S. Myhr
(S. MARY HELAN FELISTA)
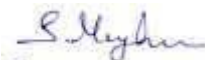
II MCA

SEMESTER – III

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	23MCA304	APPLICATION DEVELOPMENT FRAMEWORK	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides data for building a web application as a composition of the 3 roles Model, view and controller. ASP.NET MVC gives a powerful, patterns-based way to build dynamic websites that gives full control over markup for enjoyable and agile development.

COURSE OBJECTIVE

❖ To understand the difference between desktop and dynamic web applications.

❖ To create and modify multi-page web form applications

❖ To develop dynamic web applications, create and consume web services

UNIT- I BUILDING ASP.NET MVC APPLICATIONS   (12 Hours)

Introduction – ASP.Net MVC part of ASP.Net Framework – Origins of MVC – Architecture – ASP.Net MVC Folder Conventions – Running Application – Blank Slate – Create Database – Create Model – Create Controller – Create Views Understanding Controllers, Actions

Creating Controller – Returning Action Result – View Result – Redirect Result – Content Result – JSON Result – File Result – Invoking Actions – Use Accept Verbs – Action Name – Action Method Selector – Handling Unknown Actions – Testing Controllers and Actions

SELF STUDY: Origins of MVC

UNIT- II UNDERSTANDING VIEWS, MODELS   **(12 Hours)**

Create View – Type and Untyped Views – Stongly Typed Views –Custom View Engine – Testing Views – HTML Helpers – Models –Repository Pattern – Dependency Injection Pattern – Create Generic Repository- LINQ to SQL – Extending Generic Repository – Test Data Access – Test with Mock Repository – Test with Fake Generic Repository.

SELF STUDY: HTML Helpers

UNIT- III UNDERSTANDING HTML HELPERS, MODEL BINDERS (12 Hours)

Standard HTML Helpers – Rendering Links -Links – Rendering Form - Encoding HTML Content – Antiforgery Tokens – Custom HTML Helpers –Tag Builder Class – HTML Text Writer Class – Data Grid Helper – Data Grid Helper – Adding Paging to Data Grid Helper – Testing Helpers – Model Binders – Default Model Binder – Binding to Complex Classes – Using Prefixes – Form Collection Model Binder – HTTP Posted File Base Model Binder – Action Filters – Log Action Filters

SELF STUDY: Data Grid Helper

UNIT – IV VALIDATING FORM DATA, ROUTING   **(12 Hours)**

Model State – Validation Helpers – Styling Validation Error Messages – Pre and Post Binding Validation – Validating Service Layer – IDataErrorInfo Interface – Testing Validation – Routing – Using Default Route – Debugging Routes – Create Custom Routes & Route Constraints – Regular Expression Constraints – HTTP Method Constraint – Authenticated Constraint – Not Equal Constraint – All Routes – Testing Routes

View Master Pages and View User Controls

Master Pages – View Master Page – View Content Page – Setting Master Page From Controller – Setting Master Page Title – Nested Master Pages – Pass View Data to Master Pages – View User Controls – Pass View Data to User Controls – View User Control as a Template

SELF STUDY: Nested Master Pages

UNIT – V Deploying ASP.Net MVC Application   **(12 Hours)**

Configure IIS for ASP.Net MVC – Integrates Vs Classic Mode – Adding Extensions to Route Table – Hosted Server – Wild Card Script Map – Mixing

ASP.Net Web Forms and ASP.Net MVC – Modify Visual Studio Project File – Adding Required Assemblies – Modify Web Configuration File – Modify Global.asax File – Web Forms and MVC – Bin.

SELF STUDY: Wild Card Script Map

REFERENCES:

1. ASP.NET MVC Framework Unleased, Stephen Walther, Pearson Education Inc., 2010
2. ASP.NET MVC 5: A Beginner's Guide, Vincent Maverick.
3. Pro ASP.NET MVC 5, Adam Freeman, O'Reilly, Fifth Edition, 2013

WEB REFERENCES:

1. https://dotnet.microsoft.com/apps/aspnet/mvc
2. https://www.tutorialsteacher.com/mvc/asp.net-mvc-tutorials

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT 1- BUILDING ASP.NET MVC APPLICATIONS				
1.1	Introduction – ASP.Net MVC part of ASP.Net Framework– Origins of MVC – Architecture	2	Chalk & Talk	Black Board
1.2	ASP.Net MVC Folder Conventions – Running Application – Blank Slate – Create Database – Create Model – Create Controller – Create Views	3	Lecture	PPT
1.3	Creating Controller – Returning Action Result – View Result – Redirect Result – Content Result	2	Discussion	Black Board
1.4	JSON Result – File Result – Invoking Actions – Use Accept Verbs – Action Name	2	Chalk & Talk	PPT
1.5	Action Method Selector – Handling Unknown Actions – Testing Controllers and Actions	3	Discussion	Black Board
UNIT 2 - UNDERSTANDING VIEWS, MODELS				
2.1	Create View – Type and Untyped Views – Stongly Typed Views – Custom View Engine	3	Lecture	Black Board

2.2	Testing Views – HTML Helpers – Models –Repository Pattern – Dependency Injection Pattern	3	Chalk & Talk	PPT
2.3	Create Generic Repository- LINQ to SQL – Extending Generic Repository	3	Chalk & Talk	Black Board
2.4	Test Data Access – Test with Mock Repository – Test with Fake Generic Repository.	3	Chalk & Talk	PPT
UNIT 3 – UNDERSTANDING HTML HELPERS, MODEL BINDERS				
3.1	Standard HTML Helpers – Rendering Links -Links – Rendering Form - Encoding HTML Content	2	Lecture	White board
3.2	Antiforgery Tokens – Custom HTML Helpers –Tag Builder Class – HTML Text Writer Class – Data Grid Helper – Data Grid Helper – Adding Paging to Data Grid Helper	3	Chalk & Talk	Black Board
3.3	Testing Helpers – Model Binders	2	Lecture	PPT
3.4	Default Model Binder – Binding to Complex Classes	1	Lecture	Black Board
3.5	Using Prefixes – Form Collection Model Binder	2	Lecture	PPT

3.6	HTTP Posted File Base Model Binder – Action Filters – Log Action Filters	2	Chalk & Talk	Black Board
UNIT 4 - VALIDATING FORM DATA, ROUTING				
4.1	Model State – Validation Helpers – Styling Validation Error Messages – Pre and Post Binding Validation	1	Lecture	PPT
4.2	Validating Service Layer – IDataErrorInfo Interface – Testing Validation – Routing – Using Default Route	1	Lecture	Black Board
4.3	Debugging Routes – Create Custom Routes & Route Constraints – Regular Expression Constraints	2	Lecture	Black Board
4.4	HTTP Method Constraint – Authenticated Constraint – Not Equal Constraint – All Routes – Testing Routes	2	Chalk & Talk	PPT
4.5	Master Pages – View Master Page – View Content Page – Setting Master Page From Controller – Setting Master Page Title	2	Lecture	PPT
4.6	– Nested Master Pages – Pass View Data to Master Pages – View User Controls	2	Chalk & Talk	Black Board

4.7	Pass View Data to User Controls –View User Control as a Template	2	Lecture	PPT
UNIT 5 - Deploying ASP.Net MVC Application				
5.1	Configure IIS for ASP.Net MVC – Integrates Vs Classic Mode	2	Chalk & Talk	Black Board
5.2	Adding Extensions to Route Table – Hosted Server – Wild Card Script Map	3	Chalk & Talk	Black Board
5.3	Mixing ASP.Net Web Forms and ASP.Net MVC – Modify Visual Studio Project File – Adding Required Assemblies	3	Chalk & Talk	Black Board
5.4	Modify Web Configuration File – Modify Global.asax File –	2	Chalk & Talk	Black Board
5.5	Web Forms and MVC – Bin	2	Chalk & Talk	Black Board

Levels	C1 10 Mks	C2 15 Mks	C3 5+5=10 Mks .	C4 10 Mks	Total Scholastic Marks 45 Mks .	Non Scholastic Marks C5 5Mks .	CIA Total 50 Mks .	% of Assessment
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholastic	5
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

   K2-Understand**,**   *K3*-Apply**,**   *K4*-Analyse, K5 – Evaluate

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

CIA Components			Nos		
C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

*The Average of two will be taken into account

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Develop dynamic web applications using MVC	K2, K4	PSO1 & PSO2
CO 2	Analyse appropriate data sources and data bindings in ASP.NET web applications	K2, K3, K4	PSO1 & PSO2
CO 3	Apply the concept of HTML Helper to Create Websites and to use Model Binders and Action Filters	K2 , K4	PSO1 & PSO3
CO 4	Design and validate user input and navigate through webpages	K2, K3,K4 & K5	PSO1 & PSO4
CO 5	Deploying and configuring ASP.Net MVC Applications	K2,K3,K4 & K5	PSO4 & PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	2	3	1	1	1
CO3	3	1	3	1	1
CO4	3	1	1	2	1
CO5	1	1	1	3	2

Mapping of COs with POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	2	1	1	2	2	1	1	1
CO2	3	2	3	2	1	1	1	1	2	2	2	2
CO3	3	2	3	1	2	2	1	1	2	2	1	1
CO4	3	2	3	1	2	2	1	1	2	2	1	2
CO5	3	1	3	2	1	1	2	1	2	1	1	2

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

P.NANCY VINCENTINA MARY   **HOD'S Signature**

P.Nancy

S Myhn
(S. MARY HELAN FELISTA)

II MCA

SEMESTER – III

(For those who join in 2023 onwards)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS /WE EK	CREDIT S
MCA	23MCA305	LAB V - FULL STACK DEVELOPMENT	CORE	6	3

COURSE DESCRIPTION

This course givesoverview on end-to-end development of applications. It includes both the front end and back end of an application. The front end is usually accessed by a client, and the back end forms the core of the application where all the business logic is applied

COURSE OBJECTIVES

- ❖ To get familiar with the Develop back end website applications
- ❖ Learn all about responsiveness of applications
- ❖ Learn to create an end-to-end application independently

LAB LIST

1. Create a Simple Login form
2. Create a Tourism website
3. Create an online newspaper website
4. Create an online ticket booking website
5. Create an online feedback system
6. Create an E-commerce website
7. Create Food Delivery Website and Application
8. Create To-Do List Projects
9. Create Blog Website and Application

10. Create Chat Application and Website
11. Create Portfolio Website
12. Create Content Management System
13. Create an Application for Grocery Delivery
14. Create a Hotel Reservation Project

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Develop front end and back end website applications	K2	PSO1, PSO2 & PSO3
CO 2	Effectively manage website projects using available resources.	K2, K3, K4	PSO3 & PSO4
CO 3	Apply basic design principles to present ideas, information, products, and services on websites.	K2, K3 & K5	PSO4 & PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	3	1	1
CO2	1	1	2	3	1
CO3	1	1	1	2	2

Mapping of COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	2	2	2	1	2	1	2
CO2	3	1	2	1	3	2	2	3	1	2	1	2
CO3	3	2	3	2	2	3	2	3	2	2	1	3

Note: ф Strongly Correlated – **3**   ф Moderately Correlated – **2**

ф Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

S. Mary Helan Felista   **HOD'S Signature & Name**

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(S. MARY HELAN FELISTA)

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(S. MARY HELAN FELISTA)
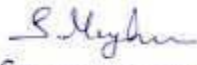
II MCA

SEMESTER – III

(For those who joined in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCA306	LAB VI – APPLICATION DEVELOPMENT FRAMEWORKS	MAJOR LAB	4	2

COURSE DESCRIPTION

This lab course provides the experience in creating, debugging, testing & deploying dynamic web applications. It also gives thorough coverage of the use of MVC for creating web applications.

COURSE OBJECTIVE

❖ To introduce .Net IDE Component Framework.

❖ To create MVC application.

❖ To create websites using ASP.Net Controls.

LAB LIST

1. Create a program to connect with database and manipulate the records in the database using ADO.NET

2. Create a program to implement the concepts of OOPS for creating class, inheritance

3. Create a program to perform input validation using procedures.

4. Create a program to perform validation using validation controls.

5. Create a program in ASP .NET to connect with the database using ADODB.

6. Write a program to Handle Exceptions.

7. Create different websites using MVC.

8. Develop a web application with 2-tier architecture.

9. Develop an employee management application using three tier architecture

10. Grid view using ASP.NET

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Create user interactive web pages using ASP.Net.	K1	PSO1, PSO2 & PSO3
CO 2	Create data binding applications using ADO.Net connectivity.	K1, K2,	PSO1, PSO3 & PSO4
CO 3	Performing Database operations for web applications using MVC.	K1 & K3	PSO4 &PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	1	1
CO2	3	1	2	2	1
CO3	1	1	1	2	2

Mapping of COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	1	2	3	1	2	1	2
CO2	3	2	2	1	1	1	2	3	1	2	1	2
CO3	3	2	3	2	2	2	2	3	2	2	1	3

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated

COURSE DESIGNER   **Forwarded By**

P.NANCY VINCENTINA MARY   **HOD'S Signature & Name**

P. Nancy

S. Mydhu
(S. MARY HELAN FELISTA)

II MCA

SEMESTER – III
(For those who join in 2023 onwards)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	23MCA307	SKILL BASED LAB III - MOBILE APPLICATION DEVELOPMENT	SKILL BASED LAB	2	1

COURSE DESCRIPTION

This course provides knowledge of developing applications for mobiles using native and hybrid frameworks.

COURSE OBJECTIVE

❖ Know the components and structure of mobile application development frameworks

❖ Learn the basic and important design concepts and issues of development of mobile applications.

❖ Write applications for the platforms used, simulate them, and test them on the mobile hardware where possible

LAB LIST FOR CREATING NATIVE APPLICATIONS USING ANDROID

1. Create Applications using Layouts.

2. Create Event Driven Applications.

3. Create Applications using Date and Time.

4. Create Applications to include Menus

5. Create an application for sending and receiving SMS

6. Creating Android Audio Video Application

7. Create an Application with One-Time, Repeating Alarms

8. Create an Application which uses Multiple Activities

9. Create an Application To Call Built In Applications.

10. Create an Application that implements database connectivity

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Install and configure Android application development tools.	K2, K4	PSO2
CO 2	Design and develop user Interfaces for the Android platform.	K2, K3, K4	PSO1& PSO2
CO 3	Apply Java programming concepts to Android application development.	K2 , K4	PSO1&PSO3
CO 4	Familiarisethe technology and business trends impacting mobile applications.	K2, K3,K4& K5	PSO1&PSO4
CO 5	Include database and maps in apps to facilitate societal centric applications	K2,K3,K4& K5	PSO1&PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	1	1	1
CO2	3	3	2	1	1
CO3	3	2	3	2	1
CO4	3	2	2	2	1
CO5	2	2	2	2	3

Mapping of COs with POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	3	1	2	2	1	1	3
CO2	3	2	3	2	1	3	1	1	2	2	2	2
CO3	3	3	3	3	2	2	1	1	2	2	2	3
CO4	3	2	2	2	2	2	1	1	2	2	1	2
CO5	3	3	2	2	1	3	2	1	2	1	1	2
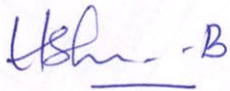
Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

 B. USHA   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCAD S01	DISTRIBUTED SYSTEMS	SPECIALIZ ATION ELECTIVE – DISTRUIBU TED SYSTEM SECURITY	4	4

COURSE DESCRIPTION

This course will be on the techniques for creating functional, usable and high performance distributed systems. This course mainly focuses on distribution and communication, data distribution, concurrency, resource sharing and protection from accidental and malicious form.

COURSE OBJECTIVE

❖ To learn the core concepts of distributed systems.

❖ To have an understanding of the how existing systems have applied the concepts of distributed systems.

❖ To have a basic proficiency to correctly solve problems in an efficient, reliable and scalable way.

UNIT – I INTRODUCTION (12 Hours)

What Is A Distributed System? Characteristic 1: Collection of Autonomous Computing Elements - Characteristic 2: Single Coherent System - Middleware and Distributed Systems - Types of Distributed Systems - High Performance Distributed Computing - Distributed Information Systems - Pervasive Systems - Architectural Styles - Layered Architectures - Object-Based and Service-Oriented Architectures - Resource-Based Architectures - Publish-Subscribe Architectures.

SELF STUDY: Pervasive Systems.

UNIT - II PROCESS   **(12 Hours)**

Threads - Introduction To Threads - Threads In Distributed Systems - Virtualization - Principle of Virtualization - Application of Virtual Machines To Distributed Systems - Clients - Networked User Interfaces - Client-Side Software For Distribution Transparency - Servers - General Design Issues - Object Servers - Example: The Apache Web Server - Server Clusters.

SELF STUDY: Principle of Virtualization.

UNIT - III COMMUNICATION   **(12 Hours)**

Foundations - Layered Protocols - Types of Communication - Remote Procedure Call - Basic RPC Operation - Parameter Passing - RPC-Based Application Support - Variations on RPC - Naming - Names, Identifiers and Addresses - Flat Naming - Simple Solutions - Home-Based Approaches - Distributed Hash Tables - Hierarchical Approaches.

SELF STUDY: Home-Based Approaches.

UNIT – IV COORDINATION, CONSISTENCY AND REPLICATION   **(12 Hours)**

Clock Synchronization - Physical Clocks - Clock Synchronization Algorithms - Logical Clocks - Lamport's Logical Clocks - Vector Clocks - Data-Centric Consistency Models - Continuous Consistency - Consistent Ordering of Operations - Eventual Consistency.

SELF STUDY: Continuous Consistency.

UNIT - V SECURITY   **(12 Hours)**

Introduction to Security - Security Threats, Policies and Mechanisms - Design Issues - Cryptography -Secure Channels - Authentication - Message Integrity and Confidentiality - Secure Group Communication - Example: Kerberos - Access Control - General Issues In Access Control - Firewalls - Secure Mobile Code -Denial of Service - Secure Naming .

SELF STUDY: Authentication.

REFERENCE BOOKS:

1. M. Van Steen, A.S. Tanenbaum, "Distributed Systems", Third Edition, CreateSpace Independent Publishing Platform, 2017.

2. George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, "Distributed Systems:Concepts and Design", Fifth Edition, Pearson Education, 2017.

3. Fokkink W. "Distributed algorithms: an intuitive approach", Second Edition, MIT Press,2018.

WEB RESOURCES:

1. http://en.wikipedia.org/wiki/Distributed Systems

2. https://www.google.co.in/books/edition/Designing_Distributed_Systems

3. https://www.google.co.in/books/edition/Understanding_Distributed_Systems/

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT 1 INTRODUCTION				
1.1	What Is A Distributed System? Characteristic 1: Collection of Autonomous Computing Elements	2	Chalk & Talk	Black Board
1.2	Characteristic 2: Single Coherent System, Middleware And Distributed Systems	2	Chalk & Talk	Black Board
1.3	Types of Distributed Systems, High Performance Distributed Computing	2	Lecture	White board
1.4	Distributed Information Systems , Pervasive Systems, Architectural Styles	2	Chalk & Talk	Black Board
1.5	Layered Architectures, Object-Based And Service-Oriented Architectures	2	Discussion	Black Board
1.6	Resource-Based Architectures , Publish-Subscribe Architectures	2	Lecture	White board
UNIT 2PROCESS				
2.1	Threads, Introduction to Threads , Threads in Distributed Systems	2	Lecture	PPT
2.2	Virtualization, Principle of Virtualization	2	Chalk & Talk	Black Board
2.3	Application of Virtual Machines To Distributed Systems, Clients, Networked User Interfaces	2	Lecture	PPT
2.4	Client-Side Software for Distribution Transparency , Servers	2	Lecture	White board

2.5	General Design Issues, Object Servers	2	Discussion	Black Board
2.6	Example: The Apache Web Server , Server Clusters.	2	Lecture	PPT
UNIT3COMMUNICATION				
3.1	Foundations, Layered Protocols	1	Lecture	White board
3.2	Types of Communication, Remote Procedure Call	1	Chalk & Talk	Black Board
3.3	Basic RPC Operation, Parameter Passing -	1	Lecture	PPT
3.4	RPC-Based Application Support	1	Lecture	White board
3.5	Variations on RPC	1	Discussion	Black Board
3.6	Naming, Names, Identifiers and Addresses	2	Lecture	PPT
3.7	Flat Naming	1	Chalk & Talk	Black Board
3.8	Simple Solutions, Home-Based Approaches	2	Lecture	White board
3.9	Distributed Hash Tables	1	Chalk & Talk	Black Board
3.10	Hierarchical Approaches.	1	Chalk & Talk	Black Board
UNIT 4COORDINATION, CONSISTENCY AND REPLICATION				
4.1	Clock Synchronization, Physical Clocks	1	Lecture	PPT
4.2	Clock Synchronization Algorithms	2	Lecture	PPT
4.3	Logical Clocks	1	Chalk & Talk	Black Board
4.4	Lamport's Logical Clocks	2	Chalk & Talk	Black Board
4.5	Vector Clocks	1	Discussion	Black Board
4.6	Data-Centric Consistency Models	2	Lecture	PPT
4.7	Continuous Consistency,	2	Chalk & Talk	Black Board

	Consistent Ordering of Operations			
4.8	Eventual Consistency	1	Lecture	PPT
UNIT5SECURITY				
5.1	Introduction to Security, Security Threats, Policies and Mechanisms	2	Chalk & Talk	Black Board
5.2	Design Issues, Cryptography, Secure Channels, Authentication	2	Lecture	PPT
5.3	Message Integrity and Confidentiality	2	Lecture	PPT
5.4	Secure Group Communication , Example: Kerberos	2	Lecture	White board
5.5	Access Control, General Issues In Access Control, Firewalls	2	Lecture	White board
5.6	Secure Mobile Code, Denial of Service, Secure Naming	2	Lecture	White board

Levels	C1 10 Mks	C2 15 Mks	C3 5+5=10 Mks .	C4 10 Mks	Total Scholastic Marks 45 Mks .	Non Scholastic Marks C5 5 Mks .	CIA Total 50 Mks .	% of Assess ment
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholasti	5
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

   K2-*Understand***, K3**-*Apply***, K4**-*Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**   **Nos**

C1   –   Test (CIA 1)   2*   -   10 Mks

C2   -   Test (CIA 2)   1   -   15 Mks

C3   -   Assignment / Open Book Test   2   -   10 Mks

C4   -   Seminar   1   -   10 Mks

C5   -   Attendance   1   -   5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the design principles in distributed systems and the architecturesfor distributed systems.	K2, K4	PSO1,PS02
CO 2	Apply various distributed algorithms related to clock synchronization, concurrencycontrol, deadlock detection, load balancing, voting etc.	K2, K3, K4	PSO2, PSO3
CO 3	Analyze fault tolerance and recovery in distributed systems and algorithmsfor the same.	K2 , K4	PSO1, PSO3
CO 4	Analyze the design and functioning of existing distributed systems and file systems.	K2, K3, K4& K5	PSO4, PSO5
CO 5	Implement different distributed algorithms over current distributed platforms	K2,K3, K4& K5	PS03, PSO4

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	1	2	3	1	1
CO3	3	1	2	1	1
CO4	1	1	1	2	3
CO5	1	1	2	3	1

Mapping of COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	1	1	3	1	2	1	1	1	1	1	1	1
CO3	1	3	1	1	1	1	1	2	1	1	1	1
CO4	1	3	1	1	1	2	1	1	1	1	1	1
CO5	3	1	1	1	1	1	2	1	1	1	1	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**
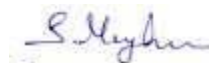
COURSE DESIGNER

DR. R. SMEETA MARY

Forwarded By

HOD'S Signature & Name

(S. MARY HELAN FELISTA)

I MCA

SEMESTER – I

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCADS02	SECURED WIRELESS COMMUNICATION	SPECIALIZATION ELECTIVE – DISTRIBUTED SYSTEM SECURITY	4	4

COURSE DESCRIPTION

This course provides knowledge on wireless communication and its security implications.

COURSE OBJECTIVE

❖ To learn the basic threats of security in a Mobile Environment
❖ To get familiar with Wireless LAN architecture and its security
❖ To get to learn the benefits, architecture and security of Bluetooth.
❖ To be acquainted with GSM and CDPD
❖ To understand the basic concepts of WAP and its security features

UNIT – I   **(12 Hours)**

SECURITY FEATURES IN WIRELESS ENVIRONMENT

Introduction – Mobile Network Environment – General Security Threats of a Network – Limitations of Mobile Environment – Mobility and Security – Attacks in Mobile Environment- Security issues in Mobile Environment

SELF STUDY: Limitations of Mobile Environment

UNIT – II **(12 Hours)**

IEEE 802.11

History –IEEE 802.11 Architecture - IEEE 802.11Layers – Security of IEEE 802.11 – Key Management – Weakness of WEP

SELF STUDY: Weakness of WEP

UNIT – III **(12 Hours)**

BLUETOOTH

Overview – History – Benefits – Architecture and Components – Security of Bluetooth – Problems in the Security of Bluetooth

SELF STUDY: Problems in the Security of Bluetooth

UNIT – IV **(12 Hours)**

GSM

Introduction – Architecture of the GSM Network – GSM Security Features – Attacks on GSM Security

CDPD

Introduction – Basic Idea – Basic Infrastructure – Working of a CDPD Connection – CDPD Security

SELF STUDY: Attacks on GSM Security

UNIT – V **(12 Hours)**

WIRELESS APPLICATION PROTOCOL

Introduction –WAP Protocol Stack – WAP PKI Model – Cipher Suite in WTLS – WAP Profiled TLS – WAP Identity Module

SELF STUDY: WAP Profiled TLS

REFERENCES:

1. Hideki Imai, Mohammad Ghulam Rahman, "Wireless Communications Security", KazukuniKobara, Artech House, 2007

2. Steve S. Thomas, "Wireless Communications Security", Create Space Independent Publishing, 2010.

3. Jyrki T. J. Penttinen,"Wirelesss Communications Security Solutions for the Internet of Things", John Wiley & Sons Ltd, 2017

4. Jochen Schiller, "Mobile communication", Second Edition, Pearson Education,12th Impression, 2013.

WEB REFERENCES:

1. https://ieeexplore.ieee.org/book/8040112
2. https://resources.infosecinstitute.com/topic/wireless-networks-and-security/
3. https://jwcn-eurasipjournals.springeropen.com/articles/10.1155/2009/532434

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 SECURITY FEATURES IN WIRELESS ENVIRONMENT				
1.1	Introduction - Mobile Network Environment	3	Chalk & Talk	Black Board
1.2	General Security Threats of a Network – Limitations of Mobile Environment	3	Discussion	Google classroom
1.3	Mobility and Security – Attacks in Mobile Environment	3	Lecture	PPT & White board
1.4	Security issues in Mobile Environment	3	Lecture	Smart Board
UNIT 2 - IEEE 802.11				
2.1	History –IEEE 802.11 Architecture	3	Discussion	Black Board
2.2	IEEE 802.11Layers	3	Lecture	Google classroom
2.3	Security of IEEE 802.11	3	Lecture	PPT & White board
2.4	Key Management – Weakness of WEP	3	Lecture	Smart Board
UNIT 3 – BLUETOOTH				
3.1	Overview – History – Benefits	3	Discussion	Black Board

3.2	Architecture and Components	3	Lecture	PPT
3.3	Security of Bluetooth	3	Lecture	PPT & White board
3.4	Problems in the Security of Bluetooth	3	Lecture	Smart Board
UNIT 4 – MOBILE IP				
4.1	GSM - Introduction – Architecture of the GSM Network	3	Lecture	PPT
4.2	Attacks on GSM Security	2	Lecture	PPT
4.3	CDPD - Introduction – Basic Idea – Basic Infrastructure	3	Lecture	PPT
4.4	Working of a CDPD Connection	2	Lecture	PPT
4.4	CDPD Security	2	Lecture	PPT & White board
UNIT 5 – WIRELESS APPLICATION PROTOCOL				
5.1	Introduction – WAP Protocol Stack	3	Lecture	PPT
5.2	WAP PKI Model	2	Lecture	PPT
5.3	Cipher Suite in WTLS	3	Lecture	Smart Board
5.4	WAP Profiled TLS	2	Lecture	PPT
5.5	WAP Identity Module	2	Lecture	PPT

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho .	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholasti	5
	50

- ✓ **All the course outcomes are to be assessed in the various CIA components.**
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

  K2-*Understand,*   **K3**-*Apply,*   **K4**-*Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

			Nos		
C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- **The Average of two will be taken into account**

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify, Predict and Evaluate the security features in wireless environment	K2, K4	PSO1 & PSO3
CO 2	Demonstrate the architectures, challenges and solutions of Wireless LAN	K2, K3, K4	PSO2 & PSO3
CO 3	Assess the role of Bluetooth architecture & security in wireless communication	K2 , K4	PSO3 & PSO5
CO 4	Analyse the architecture, infrastructure and security conceptions of GSM & CDPD	K2, K3,K4& K5	PSO1 & PSO4
CO 5	Study the Design aspects of wireless application protocol	K2,K3,K4& K5	PSO1 & PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	1	1	2
CO2	1	3	2	1	1
CO3	1	1	3	1	2
CO4	2	1	1	3	1
CO5	2	1	1	1	3

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

Mapping of C0s with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1	2	2	2	1	1	1	2	1
CO2	3	2	2	1	1	3	3	1	1	1	3	1
CO3	1	2	1	1	1	2	2	2	1	3	2	2
CO4	1	1	3	2	2	2	1	1	1	1	2	1
CO5	2	2	3	1	1	3	2	1	2	3	1	1

COURSE DESIGNER: **Forwarded By**

B.USHA   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)

II MCA
SEMESTER – III
(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCADS06	WEB SECURITY	SPECIALIZATION ELECTIVE	4	4

COURSE DESCRIPTION

The course enlightens on the security considerations in the web

COURSE OBJECTIVES

❖ To Give an Overview of information security
❖ To Understand how common mistakes can be bypassed and exploit the application
❖ To provide a knowledge on the security issues to be handled in the web

UNIT – I   **(12 Hours)**

WEB SECURITY

The Web Security Landscape :The Web Security Problem -Risk Analysis and Best Practices – Cryptography and the Web : Cryptography and Web Security – Roles for Cryptography - Working Cryptographic Systems and Protocols – Offline Encryption Systems – Online Cryptographic Systems and Protocols – What Cryptography Cant Do?

SELF STUDY : Cryptography and Web Security

UNIT – II   **(12 Hours)**

DIGITAL IDENTIFICATION

Passwords, Biometrics and Digital Signatures : Physical Identification – Paper Based & Computer Based Identification Techniques - Using Public Keys for Identification – Digital Certificates, CAs and PKI: Understanding Digital

Certificate with PGP – Certifying Own Key - Certifying other Peoples Key – Certification Authorities – Third Party Registrar – Certification Practices Statement(CPS) – Types of Certificate – Revocation

SELF STUDY : Physical Identification

UNIT – III   (12 Hours)
PRIVACY PROTECTION

The Webs War on Your Privacy: Understanding Privacy – User-Provided Information – Log Files – Understanding Cookies – Privacy Protection Techniques: Choosing a Good Service Provider – Picking a Great Password – Cleaning Up After Yourself – Avoiding Spam and Junk Email – Identify Theft

SELF STUDY : Cleaning Up After Yourself

UNIT – IV   (12 Hours)
WEB SERVER SECURITY

Physical Security for Servers: Planning for the Forgotten Threats – Protecting Computer Hardware – Protecting Your Data - Personnel - Securing Web Applications: Legacy of Extensibility and Risk – Rules to Code By – Securely using Fields, Hidden Fields and Cookies – Rules for Programming Languages – Using PHP Securely

SELF STUDY : Legacy of Extensibility and Risk

UNIT – V   (12 Hours)
SECURITY FOR CONTENT PROVIDERS

Digital Payments: Charga – Plates, Diners Club and Credit Cards – Internet Based Payment Systems – How to Evaluate a Credit Card Payment System - Intellectual Property and Actionable Content: Copyright – Patents – Trademarks – Actionable content

SELF STUDY : Digital Payments

REFERENCES:

1. Simson Garfinkel, Gene Spafford, Web Security, Privacy and Commerce, O'Reilly.
2. Andrew Hoffman, Web Application Security: Exploitation and Countermeasures for Modern Web Applications, O'reilly
3. Jonathan LeBlanc Tim Messerschmidt, Identity and Data Security for Web Development - Best Practices, O'reilly
4. McDonald Malcolm, Web Security for Developers, No Starch Press, US

WEB REFERENCES:

1. https://www.edureka.co/blog/application-security-tutorial/
2. https://www.invicti.com/blog/web-security/getting-started-web-application-security/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 WEB SECURITY				
1.1	The Web Security Problem -Risk Analysis and Best Practices	3	Chalk & Talk	Black Board
1.2	Cryptography and the Web- Cryptography and Web Security	3	Discussion	Google classroom
1.3	Working Cryptographic Systems and Protocols	2	Lecture	PPT & White board
1.4	Offline Encryption Systems – Online Cryptographic Systems and Protocols	2	Lecture	Smart Board
1.5	What Cryptography Cant Do?	2	Lecture	PPT & White board
UNIT 2 - DIGITAL IDENTIFICATION				
2.1	Physical Identification – Paper Based & Computer Based Identification Techniques	2	Discussion	Black Board
2.2	Using Public Keys for Identification	2	Lecture	Google classroom
2.3	Understanding Digital Certificate with PGP – Certifying Own Key	2	Lecture	PPT & White board
2.4	Certifying other Peoples Key –	2	Lecture	Smart

	Certification Authorities			Board
2.5	Third Party Registrar – Certification Practices Statement(CPS)	2	Lecture	Smart Board
2.6	Types of Certificate – Revocation	2	Discussion	Black Board

		UNIT 3 – PRIVACY PROTECTION		
3.1	Understanding Privacy – User-Provided Information	2	Discussion	Black Board
3.2	Log Files – Understanding Cookies	2	Lecture	PPT
3.3	Privacy Protection Techniques: Choosing a Good Service Provider	3	Lecture	PPT & White board
3.4	Picking a Great Password – Cleaning Up After Yourself	3	Lecture	Smart Board
3.5	Avoiding Spam and Junk Email – Identify Theft	2	Lecture	PPT

		UNIT 4 – WEB SERVER SECURITY		
4.1	Physical Security for Servers	2	Lecture	PPT
4.2	Planning for the Forgotten Threats – Protecting Computer Hardware	2	Lecture	PPT
4.3	Protecting Your Data - Personnel	2	Lecture	PPT
4.4	Securing Web Applications: Legacy of Extensibility and Risk	2	Lecture	PPT

4.5	Rules to Code By – Securely using Fields, Hidden Fields and Cookies	2	Discussion	Black Board
4.6	Rules for Programming Languages – Using PHP Securely	2	Lecture	PPT
UNIT 5 – SECURITY FOR CONTENT PROVIDERS				
5.1	Digital Payments: Charga – Plates, Diners Club and Credit Cards	3	Lecture	PPT
5.2	Based Payment Systems- How to Evaluate a Credit Card Payment System	3	Lecture	PPT
5.3	Intellectual Property and Actionable Content: Copyright – Patents	3	Lecture	Smart Board
5.4	Trademarks – Actionable content	3	Lecture	PPT

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholasti	5
	50

- ✓ **All the course outcomes are to be assessed in the various CIA components.**
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

K2-Understand, K3-Apply, K4-Analyse, K5 – Evaluate

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

  Nos

C1	–	Test (CIA 1)	2* -	10 Mks
C2	-	Test (CIA 2)	1 -	15 Mks
C3	-	Assignment / Open Book Test	2 -	10 Mks
C4	-	Seminar	1 -	10 Mks
C5	-	Attendance	1 -	5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the Web architecture and applications	K2, K4	PSO1 & PSO3
CO 2	Ascertain the concept of digital identification	K2, K3, K4	PSO2 & PSO3
CO 3	Assess the threats on privacy in the web	K2 , K4	PSO3 & PSO5
CO 4	Demonstrate security solutions for web servers	K2, K3,K4& K5	PSO1 & PSO4
CO 5	Analyse the common vulnerabilities towards content providers	K2,K3,K4& K5	PSO1 & PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	1	1	2
CO2	1	3	2	1	1
CO3	1	1	3	1	2
CO4	2	1	1	3	1
CO5	2	1	1	1	3

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

Mapping of C0s with POs
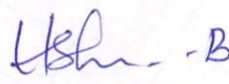
CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1	2	2	2	1	1	1	2	1
CO2	3	2	2	1	1	3	3	1	1	1	3	1
CO3	1	2	1	1	1	2	2	2	1	3	2	2
CO4	1	1	3	2	2	2	1	1	1	1	2	1
CO5	2	2	3	1	1	3	2	1	2	3	1	1

COURSE DESIGNER: **Forwarded By**

B.USHA   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)

SKILL DEVELOPMENT – 100%

I MCA

SEMESTER - II

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCAAM03	MACHINE LEARNING	SPECIALIZATION ELECTIVE – AI & MACHINE LEARNING	4	4

COURSE DESCRIPTION

This course provides an introduction to learn Machine Intelligence and Machine Learning Applications algorithms to solve real world problems.

COURSE OBJECTIVE

- ❖ To introduce the fundamentals of Machine Learning, the classifiers and its associated algorithms.
- ❖ To define the knowledge on supervised and unsupervised learning algorithms used for classification, prediction and clustering.
- ❖ To impart ability to write simple to intermediate programs in expert systems through scikit learn tools.

UNIT- I INTRODUCTION   (12 Hours)

Introduction To Machine Learning -Learning Problems – Learning System – Issues In Machine Learning - Concept Learning - Learning Task – General-To-Specific Ordering – Inductive Bias.

SELF STUDY : Choosing The Target Function

UNIT-II DECISION TREE & BAYESIAN LEARNING   **(12 Hours)**

Decision Tree Learning -Bayesian Learning - Bayes Theorem – Bayes Theorem and Concept Learning – Naive Bayes Classifier - Bayesian Networks.
SELF STUDY : Avoiding Overfitting the Data.

UNIT - III CLUSTERING   **(12 Hours)**

Introduction - Mixture Densities - K-Means Clustering - Mixtures of Latent Variable Models - Supervised Learning After Clustering - Spectral Clustering - Hierarchical Clustering - Choosing the Number of Clusters.
SELF STUDY: Choosing the Number of Clusters.

UNIT-IV GENETIC ALGORITHMS   **(12 Hours)**

Introduction to Instance Based Learning – K-Nearest Neighbor Learning - Genetic Algorithms - Hypotheses – Genetic Operators – Genetic Programming.
SELF STUDY: Parallelizing Genetic Algorithms.

UNIT-V SCIKIT-LEARN   **(12 Hours)**

Scikit-Learn–Introduction - Modelling process - Data Representation - Estimator API – Conventions - Linear Modelling - Support Vector Machine - Classification with Naïve Bayes - Decision Trees - Clustering Methods.
SELF STUDY: Decision Trees.

REFERENCE BOOKS:
1. Tom M. Mitchell, "Machine Learning", Tata McGraw-Hill, New Delhi, 2021.
2. Hastie.T, Tibshirani.R, and Friedman.J, "The Elements of Statistical Learning: Data Mining Inference and Prediction", Second edition, Springer, 2013.
3. Christopher M. Bishop, "Pattern Recognition and Machine Learning" – Information Science and Statistics, Springer, 2016.

WEB RESOURCES:

1. https://machinelearningmastery.com/machine-learning-with-python/
2. http://ibpsa.fr/jdownloads/Simurex/2015/Presentations/30_03_atelierd atamining.pdf
3. https://www.tutorialspoint.com/knime/index.htm

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT 1 INTRODUCTION				
1.1	Introduction to Machine Learning	1	Chalk & Talk	Black Board
1.2	Learning Problems	2	Chalk & Talk	Black Board
1.3	Learning System	2	Lecture	PPT
1.4	Issues in Machine Learning	2	Chalk & Talk	Black Board
1.5	Concept Learning	1	Discussion	Black Board
1.6	Learning Task	1	Lecture	White board
1.7	General-To-Specific Ordering	2	Lecture	PPT
1.8	Inductive Bias	1	Lecture	White board
UNIT 2 DECISION TREE & BAYESIAN LEARNING				
2.1	Decision Tree Learning	2	Lecture	PPT
2.2	Bayesian Learning	2	Discussion	Black Board
2.3	Bayes Theorem	2	Chalk & Talk	PPT
2.4	Bayes Theorem and Concept Learning	2	Lecture	White board
2.5	Naive Bayes Classifier	2	Discussion	Black Board
2.6	Bayesian Networks	2	Lecture	PPT
UNIT 3 CLUSTERING				
3.1	Introduction, Mixture Densities	2	Lecture	PPT
3.2	K-Means Clustering, Mixtures of Latent Variable Models	2	Lecture	PPT
3.3	Supervised Learning After Clustering	2	Chalk & Talk	Black Board

3.4	Spectral Clustering	2	Chalk & Talk	Black Board
3.5	Hierarchical Clustering	2	Discussion	Black Board
3.6	Choosing the Number of Clusters.	2	Discussion	Google classroom
UNIT 4 GENETIC ALGORITHMS				
4.1	Introduction to Instance Based Learning	2	Lecture	White board
4.2	K-Nearest Neighbor Learning	2	Chalk & Talk	Black Board
4.3	Genetic Algorithms	2	Lecture	PPT
4.4	Hypotheses	2	Lecture	White board
4.5	Genetic Operators	2	Lecture	PPT
4.6	Genetic Programming	2	Discussion	Google classroom
UNIT 5 SCIKIT-LEARN				
5.1	Scikit-Learn ,Introduction, Modelling process	2	Chalk & Talk	White Board
5.2	Data Representation, Estimator API	2	Demonstration	LCD
5.3	Conventions, Linear Modelling	2	Demonstration	LCD
5.4	Support Vector Machine	2	Demonstration	LCD
5.5	Classification with Naïve Bayes	2	Demonstration	LCD
5.6	Decision Trees, Clustering Methods	2	Demonstration	LCD

Levels	C1 10 Mks	C2 15 Mks	C3 5+5=10 Mks .	C4 10 Mks	Total Scholastic Marks 45 Mks .	Non Scholastic Marks C5 5 Mks .	CIA Total 50 Mks .	% of Assessment
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholasti	5
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

   K2-Understand**,**   *K3*-Apply**,**   *K4*-Analyse, K5 – Evaluate

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**   **Nos**

C1   –   Test (CIA 1)   2*   -   10 Mks

C2   -   Test (CIA 2)   1   -   15 Mks

C3   -   Assignment / Open Book Test   2   -   10 Mks

C4   -   Seminar   1   -   10 Mks

C5   -   Attendance   1   -   5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the concepts of machine learning	K2, K4	PSO1,PS02
CO 2	Demonstrate Decision Tree learning and Bayesian Learning for classification.	K2, K3, K4	PSO2, PSO3
CO 3	Design and carry out an empirical evaluation of different algorithms on a clustering and state the conclusions that the evaluation supports.	K2 , K4	PSO1, PSO3
CO 4	Analyze the logic behind Genetic Algorithms.	K2, K3, K4& K5	PSO4, PSO5
CO 5	Apply the concepts of Expert Systems in machine learning, Examine and Explore scikit learn techniques	K2,K3, K4& K5	PS03, PSO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	1	2	3	1	1
CO3	3	1	2	1	1
CO4	1	1	1	2	3
CO5	1	1	2	3	1

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	1	1	3	1	2	1	1	1	1	1	1	1
CO3	1	3	1	1	1	1	1	2	1	1	1	1
CO4	1	3	1	1	1	2	1	1	1	1	1	1
CO5	3	1	1	1	1	1	2	1	1	1	1	1

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

 ♦ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

DR. R. SMEETA MARY   HOD'S Signature & Name

(S. MARY HELAN FELISTA)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCAGE01	E-CONTENT DEVELOPMENT	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course helps to promote content generation, adaptation and distribution of e–content through electronic media

COURSE OBJECTIVES

❖ To identify the multimedia principles and elements for E–Learning

❖ To Understand the techniques to create customized lessons

❖ To work on the audio and video editing tools

UNIT I: INTRODUCTION TO E–LEARNING (12 Hours)

Introduction–Need for e–learning – Objectives–Trends – Benefits – Challenges–Phases of E–Content– Characteristics–Components–Elements of e–content–Content Generation–Adaptation.

SELF STUDY: Phases of E–Content

UNIT II: MULTIMEDIA IN E–CONTENT DEVELOPMENT (12 Hours)

Electronic Content (E–content)– Designing and Development of E–content–Standards of E–content– Learning Objects and Re–usability of E–content.

SELF STUDY: Re–usability of E–content

UNIT III: E–CONTENT TOOL (12 Hours)

Tools– Freeware– Open Source Software (OSS)– Proprietary software– Public domain software.

SELF STUDY: Freeware

UNIT IV: GRAPHICS, AUDIO AND VIDEO EDITING   (12 Hours)

Wevideo –Magisto–DrawPad–PhotoShop–MyPaint–Inkscape–GIMP –WavePad–Audacity–Case Study – VideoPad –Magisto –VideoPad –Openshot –Concept mapping–Visual Understanding Environment (VUE)–Case Study.

SELF STUDY: GIMP

UNIT V:AUTHORING TOOLS   (12 Hours)

Introduction – Charecteristics – eXe Learning – Xerte –Generation –Adaptation – Distribution of E–Content – Case Study

SELF STUDY: Adaptation

<u>REFERENCE BOOKS:</u>

1. Critical Understanding of ICT, Unit 12: E–Content and Open Educational Resources (OER)

<u>WEB REFERENCES:</u>

1. https://onlinecourses.swayam2.ac.in/ntr20_ed11/preview
2. https://sites.google.com/site/bethanycollegeofteacheredn/e-content-and-open-educational-resources

COURSE CONTENTS & LECTURE SCHEDULE :

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I: INTRODUCTION TO E-LEARNING				
1.1	Introduction-Need for e-learning	1	Chalk & Talk	Black Board
1.2	Objectives-Trends – Benefits	1	Chalk & Talk	LCD
1.3	Challenges-Phases of E-Content	1	Lecture	PPT & White board
1.4	Characteristics-Components-	1	Lecture	Smart Board
1.5	Elements of e-content-Content	1	Lecture	Smart Board
1.6	Generation-Adaptation	1	Lecture	Smart Board
UNIT 2: MULTIMEDIA IN E-CONTENT DEVELOPMENT				
2.1	Designing and Development of E-content	2	Chalk & Talk	Black Board
2.2	Standards of E-content	2	Chalk & Talk	LCD
2.3	Learning Objects and Re-	2	Lecture	PPT &

	usability of E-content			White board

UNIT -3 E-CONTENT TOOLS				
3.1	Tools- Freeware	1	Chalk & Talk	Black Board
3.2	Open Source Software (OSS)	2	Chalk & Talk	LCD
3.3	Proprietary software	2	Lecture	PPT & White board
3.4	Public domain software	1	Lecture	Smart Board

UNIT -4 GRAPHICS, AUDIO AND VIDEO EDITING				
4.1	Wevideo –Magisto-DrawPad	1	Chalk & Talk	Black Board
4.2	PhotoShop-MyPaint-Inkscape-GIMP	1	Chalk & Talk	LCD
4.3	WavePad-Audacity-Case Study	1	Lecture	PPT & White board
4.4	VideoPad –Magisto –VideoPad-Openshot	1	Lecture	Smart Board
4.5	Concept mapping	1	Lecture	Black Board

4.6	Visual Understanding Environment (VUE)-Case Study	1	Discussion	Google classroom
UNIT -5 AUTHORING TOOLS				
5.1	Charecteristics-eXe Learning	1	Chalk & Talk	Black Board
5.2	Xerte	2	Chalk & Talk	LCD
5.3	Generation-Adaptation	2	Lecture	PPT & White board
5.4	Distribution of E-Content-Case Study	1	Lecture	Smart Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholasti	5
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

   K2-*Understand*,   **K3**-*Apply*,   **K4**-*Analyse,* **K5** – *Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

			Nos		
C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand E-Learning with respect to its needs, challenges and benefits	K1	PSO1& PSO2
CO 2	Explain the components of Authoring tools and E-learning standards	K1, K2	PSO2, PSO3
CO 3	Apply Audio editing techniques for creating podcasts	K1 & K3	PSO3, PSO5
CO 4	Understand the techniques of creating customized lessons	K1, K2& K3	PSO5, PSO8
CO 5	Create videos using online tools	K3& K4	PSO8

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	1	1	1
CO2	1	3	3	1	1
CO3	1	1	3	1	1
CO4	1	1	1	2	3
CO5	1	1	2	3	1

Mapping COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	2	3	3	2	1	2	1	2
CO2	1	2	3	2	3	2	2	3	1	2	1	2
CO3	1	3	1	2	2	3	3	1	3	3	2	3
CO4	2	2	3	3	1	1	2	2	2	2	2	2
CO5	1	2	3	1	1	3	2	2	2	2	1	2

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**
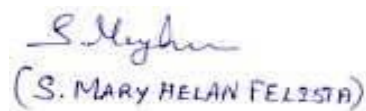
♦ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

 S. JEBAPRIYA   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)

I MCA

GENERAL ELECTIVE - MCA

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCAG E08	PRINCIPLES OF ARTIFICIAL INTELLIGENCE	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides the basic concepts of artificial intelligence. It will cover different strategies in various knowledge representations. It also provides the concepts of Planning, uncertainty and learning in artificial intelligence.

COURSE OBJECTIVE

❖ To understand the concepts of Artificial Intelligence and characteristics of intelligent agents.

❖ To learn the different problems solving by searching search strategies in Artificial Intelligence.

❖ To understand the Planning techniques, Uncertainty concept and planning strategies.

UNIT – I ARTIFICIAL INTELLIGENCE   **(12 Hours)**

Introduction – What is AI - Acting Humanly: The Turing Test Approach - Thinking Humanly: The Cognitive Modeling Approach - Thinking Rationally: The "Laws of Thought" Approach - Acting Rationally: The Rational Agent Approach - History of AI - The Gestation of Artificial Intelligence - The Birth of Artificial Intelligence - AI Becomes An Industry - The Return of Neural Networks - The Emergence of Intelligent Agents.

SELF STUDY: The Emergence of Intelligent Agents.

UNIT - IIINTELLIGENT AGENTS   **(12 Hours)**

Agents and Environments – Good Behavior: The Concept of Rationality - Performance Measures – Rationality – Omniscience - Learning and Autonomy - The Nature Of Environments - Specifying The Task Environment.

SELF STUDY: Performance Measures.

UNIT - IIISOLVING PROBLEMS BY SEARCHING   **(12 Hours)**

Problem Solving Agents – Well Defined Problems and Solutions – Formulating Problems –Uninformed Search Strategies – Breadth First Search – Uniform Cost Search – Depth First Search – Depth Limited Search – Iterative Deepening Depth First Search.

SELF STUDY: Formulating Problems.

UNIT – IVPLANNING AND UNCERTAINTY   **(12 Hours)**

The Planning Problem – The Language of Planning Problems - Planning With State-Space Search - Forward State-Space Search - Backward State-Space Search - Heuristics for State-Space Search – Uncertainty - Acting Under Uncertainty - Handling Uncertain Knowledge - Uncertainty and Rational Decisions - Design For A Decision-Theoretic Agent - Basic Probability Notation - Propositions - Atomic Events - Prior Probability - Conditional Probability.

SELF STUDY: Atomic Events.

UNIT - V LEARNING   **(12 Hours)**

Forms of Learning - Inductive Learning - Learning Decision Trees - Decision Trees As Performance Elements - Expressiveness of Decision Trees - Choosing Attribute Tests - Noise and Overfitting - Broadening The Applicability of Decision Trees.

SELF STUDY: Noise and Overfitting.

REFERENCE BOOKS:

1. Stuart J.Russel, Peter Norvig, "Artificial Intelligence A Modern Approach ", 4th Edition, Pearson Education, 2021

2. Elaine Rich, Kevin Knight, "Artificial Intelligence", McGraw Hill Education Pvt Ltd., 3rdEdition, 2019.

3. Mishra Ravi Bhushan, "Artificial Intelligence", PHI learning Pvt. Ltd,2011

WEB RESOURCES:

1. http://en.wikipedia.org/wiki/Artificial_intelligence
2. http://www.cee.hw.ac.uk/~alison/ai3notes/subsection2_6_2_3.html
3. http://starbase.trincoll.edu/~ram/cpsc352/notes/heuristics.html

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT 1 ARTIFICIAL INTELLIGENCE				
1.1	Introduction, What is AI, Acting Humanly: The Turing Test Approach	2	Chalk & Talk	Black Board
1.2	Thinking Humanly: The Cognitive Modeling Approach, Thinking Rationally: The "Laws of Thought" Approach	2	Chalk & Talk	Black Board
1.3	Acting Rationally: The Rational Agent Approach	2	Lecture	White board
1.4	History of AI, The Gestation of Artificial Intelligence	2	Chalk & Talk	Black Board
1.5	The Birth of Artificial Intelligence, AI Becomes An Industry	2	Discussion	Black Board
1.6	The Return of Neural Networks, The Emergence of Intelligent Agents.	2	Lecture	White board
UNIT 2INTELLIGENT AGENTS				
2.1	Agents and Environments	2	Lecture	PPT
2.2	Good Behavior: The Concept of Rationality	2	Chalk & Talk	Black Board
2.3	Performance Measures	2	Lecture	White board
2.4	Rationality, Omniscience	2	Lecture	PPT
2.5	Learning and Autonomy, The Nature of Environments	2	Lecture	White board
2.6	Specifying The Task Environment.	2	Discussion	Black Board
UNIT3SOLVING PROBLEMS BY SEARCHING				

3.1	Problem Solving Agents	1	Lecture	White board
3.2	Well Defined Problems and Solutions	1	Chalk & Talk	Black Board
3.3	Formulating Problems	1	Lecture	PPT
3.4	Uninformed Search Strategies	1	Lecture	White board
3.5	Breadth First Search	1	Discussion	Black Board
3.6	Uniform Cost Search	2	Lecture	PPT
3.7	Depth First Search	2	Chalk & Talk	Black Board
3.8	Depth Limited Search	2	Lecture	White board
3.9	Iterative Deepening Depth First Search.	1	Chalk & Talk	Black Board
UNIT 4 PLANNING AND UNCERTAINTY				
4.1	The Planning Problem	1	Lecture	PPT
4.2	The Language of Planning Problems, Planning With State-Space Search	2	Lecture	PPT
4.3	Forward State-Space Search, Backward State-Space Search	1	Chalk & Talk	Black Board
4.4	Heuristics for State-Space Search , Uncertainty, Acting Under Uncertainty	2	Chalk & Talk	Black Board
4.5	Handling Uncertain Knowledge, Uncertainty and Rational Decisions	1	Discussion	Black Board
4.6	Design For A Decision-Theoretic Agent, Basic Probability Notation	2	Lecture	PPT
4.7	Propositions, Atomic Events	2	Chalk & Talk	Black Board
4.8	Prior Probability, Conditional	1	Lecture	PPT

	Probability			
UNIT5LEARNING				
5.1	Forms of Learning, Inductive Learning	2	Chalk & Talk	Black Board
5.2	Learning Decision Trees, Decision trees as performance elements	2	Lecture	PPT
5.3	Expressiveness of decision trees	2	Lecture	PPT
5.4	Choosing attribute tests	2	Lecture	White board
5.5	Noise and overfitting	2	Lecture	White board
5.6	Broadening the applicability of decision trees	2	Lecture	White board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
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K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholasti	5
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

K2-Understand*,*   *K3*-Apply*,*   *K4*-Analyse, K5 – Evaluate

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**   **Nos**

C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Familiar with Artificial Intelligence, its foundation and principles	K2, K4	PSO1,PS02
CO 2	Explorethe characteristics of intelligent agents.	K2, K3, K4	PSO2, PSO3
CO 3	Formulate Informed search strategies and implement search algorithms.	K2 , K4	PSO1, PSO3
CO 4	Analyze the logic behind planning and uncertainty.	K2, K3, K4& K5	PSO4, PSO5
CO 5	Identify the concepts of learning and decision trees.	K2,K3, K4& K5	PS03, PSO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	1	2	3	1	1
CO3	3	1	2	1	1
CO4	1	1	1	2	3
CO5	1	1	2	3	1

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	1	1	3	1	2	1	1	1	1	1	1	1
CO3	1	3	1	1	1	1	1	2	1	1	1	1
CO4	1	3	1	1	1	2	1	1	1	1	1	1
CO5	3	1	1	1	1	1	2	1	1	1	1	1

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

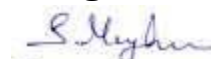**DR. R. SMEETA MARY**   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)

SKILL DEVELOPMENT – 100%

GENERAL ELECTIVE - MCA

(For those who joined in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCAGE11	CLOUD SERVICES	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides a comprehensive study of cloud concepts and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Identity as a Service (IDaaS)

COURSE OBJECTIVES

- ❖ To introduce the broad perceptive of cloud architecture and model
- ❖ To Gain knowledge on the concept of Virtualization and design of cloud Services
- ❖ To understand the issues on cloud storage & security.

UNIT–I (12 Hours)

BASICS OF CLOUD COMPUTING AND CLOUD ARCHITECTURE

Defining Cloud Computing - Cloud Types - The NIST model - The Cloud Cube Model - Deployment models - Service models -Examining the Characteristics of Cloud Computing - Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing - Understanding Cloud Architecture - Exploring the Cloud Computing Stack - Infrastructure - Platforms - Virtual Appliances- Communication Protocols – Applications.
SELF STUDY: Paradigm shift.

UNIT–II CLOUD SERVICES AND APPLICATIONS   (12 Hours)

Understanding Services and Applications by Type - Defining Infrastructure as a Service (IaaS) - IaaS workloads - Pods, aggregation, and silos - Defining Platform as a Service (PaaS) - Defining Software as a Service (SaaS) - SaaS characteristics - Open SaaS and SOA.

SELF STUDY: Open SaaS and SOA

UNIT–III ABSTRACTION VS. VIRTUALIZATION   (12 Hours)

Understanding Abstraction and Virtualization - Using Virtualization Technologies -Load Balancing and Virtualization - Advanced load balancing - The Google cloud - Understanding Hypervisors -Virtual machine types - VMware vSphere - Understanding Machine Imaging - Porting Applications - The Simple Cloud API - AppZero Virtual Application Appliance - Using PaaS Application Frameworks – Drupal - Using SaaS Application Frameworks - Google App Engine – Using IaaS Application Frameworks - Amazon Elastic Compute Cloud (EC2).

SELF STUDY: Virtual machine types

UNIT–IV CLOUD MANAGEMENT AND CLOUD SECURITY   (12 Hours)

Managing the Cloud - Administrating the Clouds - Management responsibilities - Lifecycle management - Cloud Management Products - Cloud Security - Securing the Cloud - The security boundary - Security service boundary - Security mapping - Securing Data - Brokered cloud storage access - Storage location and tenancy - Encryption - Auditing and compliance

SELF STUDY : Cloud Management Products

UNIT–V   (12 Hours)

CLOUD BASED STORAGE AND COMMUNICATING WITH CLOUD

Working with Cloud-Based Storage –Measuring the Digital Universe - Cloud storage in the Digital Universe - Cloud storage definition - Provisioning Cloud Storage - Unmanaged cloud storage - Managed cloud storage - Creating cloud storage systems - Virtual storage containers -Exploring Cloud Backup

Solutions - Backup types -Cloud backup features - Cloud attached backup - Cloud Storage Interoperability - Cloud Data Management Interface (CDMI) - Open Cloud Computing Interface (OCCI) - Communicating with the Cloud - Exploring Instant Messaging - Instant messaging clients - Instant messaging interoperability - Micro-blogs or Short Message Services.

SELF STUDY: Virtual storage containers

REFERENCES:

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley India Pvt. Ltd, 2020.
2. John W.RittingHouse, James F.Ransome, "Cloud Computing Implementation, Management and Security", CRC Press, 2013.
3. Kris Jamsa, Jones &Bartlett , "Cloud Computing" , Learning Publishers 2014.
4. Anthony T. Velte, Toby J. Velte, RoberElsenpeter, "Cloud Computing – A Practical Approach" , Mc Graw Hill publications, 2013.
5. Rajkumarbuyya, James Broberg, Andrzej Goscinski, " Computing Principles & Paradigms", Wiley India Pvt. Ltd., 2013.

WEB REFERENCES:

1. https://lecturenotes.in/subject/366/cloud-computing-cc
2. https://www.guru99.com/cloud-computing-for-beginners.html

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-I BASICS OF CLOUD COMPUTING AND CLOUD ARCHITECTURE				
1.1	Defining Cloud Computing, Cloud Types	1	Chalk & Talk	Black Board
1.2	The NIST model, The Cloud Cube Model	1	PPT	LCD
1.3	Deployment models, Service models	2	Flipped Classroom	LMS tool - Edmodo and LCD
1.4	Examining the Characteristics of Cloud Computing	1	PPT	LMS tool - Edmodo and LCD
1.5	Paradigm shift, Benefits of cloud computing	1	Group Discussion	White Board
1.6	Disadvantages of cloud computing, Understanding Cloud Architecture	2	Flipped Classroom	LMS tool - Edmodo and LCD
1.7	Exploring the Cloud Computing Stack	1	PPT	LMS tool - Edmodo and LCD
1.8	Infrastructure, Platforms	1	Brain Storming and Mind mapping	White Board
1.9	Virtual Appliances, Communication Protocols , Applications	2	Lecture	Presentation using PPT
UNIT-IICLOUD SERVICES AND APPLICATIONS				
2.1	Understanding Services and Applications by Type	2	Flipped Classroom	LMS tool - Edmodo and LCD
2.2	Defining Infrastructure as a Service (IaaS)	2	Flipped Classroom	LMS tool - Edmodo and LCD

2.3	IaaS workloads, Pods, aggregation, and silos	2	Flipped Classroom	LMS tool - Edmodo and LCD
2.4	Defining Platform as a Service (PaaS)	2	Flipped Classroom	LMS tool - Edmodo and LCD
2.5	Defining Software as a Service (SaaS)	2	PPT	LMS tool - Edmodo and LCD
2.6	SaaS characteristics	1	PPT	LMS tool - Edmodo and LCD
2.7	Open SaaS and SOA	1	Lecture	Presentation using PPT
UNIT-III ABSTRACTION VS. VIRTUALIZATION				
3.1	Understanding Abstraction and Virtualization	1	Flipped Classroom	LMS tool - Edmodo and LCD
3.2	Using Virtualization Technologies	1	Flipped Classroom	LMS tool - Edmodo and LCD
3.3	Load Balancing and Virtualization, Advanced load balancing	2	PPT	LMS tool - Edmodo and LCD
3.4	The Google cloud	1	PPT	LMS tool - Edmodo and LCD
3.5	Understanding Hypervisors, Virtual machine types, VMware vSphere	1	Chalk and Talk	Blackboard
3.6	Understanding Machine Imaging, Porting Applications, The Simple Cloud API, AppZero Virtual Application Appliance	2	PPT	LMS tool - Edmodo and LCD
3.7	Using PaaS Application Frameworks, Drupal	1	Flipped Classroom	LMS tool - Edmodo and LCD
3.8	Using SaaS Application Frameworks, Google App Engine	1	Flipped Classroom	LMS tool - Edmodo

				and LCD
3.9	Using IaaS Application Frameworks	1	Flipped Classroom	LMS tool - Edmodo and LCD
3.10	Amazon Elastic Compute Cloud (EC2)	1	Lecture	Presentation using PPT
UNIT-IV CLOUD MANAGEMENT AND CLOUD SECURITY				
4.1	Managing the Cloud, Administrating the Clouds	1	Chalk and Talk	Blackboard
4.2	Management responsibilities	1	Chalk and Talk	Blackboard
4.3	Lifecycle management	1	Chalk and Talk	Blackboard
4.4	Cloud Management Products	1	Flipped Classroom	LMS tool - Edmodo and LCD
4.5	Cloud Security	1	PPT	LMS tool - Edmodo and LCD
4.6	Securing the Cloud	1	PPT	LMS tool - Edmodo and LCD
4.7	The security boundary, Security service boundary	2	PPT	LMS tool - Edmodo and LCD
4.8	Security mapping	1	Flipped Classroom	LMS tool - Edmodo and LCD
4.9	Securing Data	1	Flipped Classroom	LMS tool - Edmodo and LCD
4.10	Brokered cloud storage access Storage location and tenancy	1	Flipped Classroom	LMS tool - Edmodo and LCD
4.11	Encryption , Auditing and compliance	1	Lecture	Presentation using PPT
UNIT-V CLOUD BASED STORAGE AND COMMUNICATING WITH CLOUD				
5.1	Working with Cloud-Based	1	Flipped	LMS tool -

	Storage, Measuring the Digital Universe, Cloud storage in the Digital Universe		Classroom	Edmodo and LCD
5.2	Cloud storage definition, Provisioning Cloud Storage, Unmanaged cloud storage, Managed cloud storage	2	Flipped Classroom	LMS tool - Edmodo and LCD
5.3	Creating cloud storage systems, Virtual storage containers	1	Flipped Classroom	LMS tool - Edmodo and LCD
5.4	Exploring Cloud Backup Solutions, Backup types, Cloud backup features, Cloud attached backup	2	PPT	LMS tool - Edmodo and LCD
5.5	Cloud Storage Interoperability, Cloud Data Management Interface (CDMI), Open Cloud Computing Interface (OCCI)	2	PPT	LMS tool - Edmodo and LCD
5.6	Communicating with the Cloud, Exploring Instant Messaging, Instant messaging clients	2	PPT	LMS tool - Edmodo and LCD
5.7	Instant messaging interoperability, Micro-blogs or Short Message Services	2	PPT	LMS tool - Edmodo and LCD

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	45
Non Scholasti	5
	50

- ✓ **All the course outcomes are to be assessed in the various CIA components.**
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

K2-Understand**,** *K3*-Apply**,** *K4*-Analyse, *K5* – Evaluate

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

			Nos		
C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO1	Examine the characteristics of Cloud Computing and the architecture	K2, K4	PSO1
CO2	Define Infrastructure and Identify service models.	K2, K3, K4	PSO2, PSO3
CO3	Relate abstraction and virtualization and cloud computing frameworks.	K2 , K4	PSO3
CO4	Manage and administrate cloud.	K2, K3, K4& K5	PSO4, PSO5
CO5	Explore cloud based storage and collaboration technologies.	K2,K3, K4& K5	PSO3, PSO4

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	1	1	1
CO2	1	3	3	1	1
CO3	1	1	3	1	1
CO4	1	1	1	2	3
CO5	1	1	2	3	1

Mapping COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	2	3	3	2	1	2	1	2
CO2	1	2	3	2	3	2	2	3	1	2	1	2
CO3	1	3	1	2	2	3	3	1	3	3	2	3
CO4	2	2	3	3	1	1	2	2	2	2	2	2
CO5	1	2	3	1	1	3	2	2	2	2	1	2

Note: ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

B.USHA   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCAGE13	INTERNET & WEB DESIGNING	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides the student with foundational programming knowledge and skills for application development on the Internet.

COURSE OBJECTIVES

- ❖ To make the students familiar with client server architecture and able to develop web applications using PHP.
- ❖ To plan, design, construct, and integrate basic server-side components of modern web applications including databases and scripts.
- ❖ To impart the skills and project-based experience needed for entry into web application and development careers.

UNIT – I JAVASCRIPT   **(12 Hours)**

Introducing JavaScript – The basics of JavaScript – Controlling program flow – Working with functions - Advanced JavaScript Coding – Document Object Model – Finding your Elements - Document Object Model form data.

SELF-STUDY: Finding your Elements.

UNIT- II JQUERY   **(12 Hours)**

Using jQuery – Loading the jQuery library – Functions – Finding elements – Replacing data – Changing styles – Changing the Document Object Model -

Reacting to events with JavaScript and jQuery – Understanding events – Focusing on JavaScript and events - Looking jQuery and events.

SELF STUDY: Changing styles.

UNIT – III INTRODUCING PHP   **(12 Hours)**

Understanding PHP Basics – Benefits – Variable – Operators - Including files - PHP Flow Control – Looping - Building own functions – Event driven PHP.

SELF STUDY: Benefits.

UNIT – IV PHP LIBRARIES   **(12 Hours)**

 PHP Libraries – Text Functions – Math Functions – Date and time functions

Sessions and carts – Storing Persistent Data – PHP and cookies – PHP and Sessions

SELF STUDY: Math Functions.

UNIT – V INTRODUCING MYSQL   **(12 Hours)**

Designing and building a database – Creating databases – Building tables - Using the database – Working with data – Searching for data - Communicating with the database from PHP Scripts – Database support in PHP – Using mysql library.

SELF STUDY: Miscellaneous functions.

REFERENCES:

1. Richard Blum, "PHP, MySQL & JavaScript All-in-One For Dummies", John Wiley & Sons, 2018
2. Alan Forbes, "The Joy of PHP",BeakCheck LLC; 6th Edition, 2020.
3. Robin Nixon, "PHP, MYSQL, JavaScript & CSS",5th Edition, O'Reilly, 2020
4. Chris Minnick, Eva Holland, "HTML, CSS, & JavaScript for Dummies", John Wiley & Sons,2018

WEB REFERENCES:

1. https://www.w3schools.com/html/html5_intro.asp
2. https://www.w3schools.com/php/default.asp
3. https://en.wikiversity.org/wiki/Computer_architecture_and_organization

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 JAVASCRIPT				
1.1	Introducing JavaScript	1	Chalk & Talk	Black Board
1.2	The basics of JavaScript	2	Chalk & Talk	LCD
1.3	Controlling program flow	2	Lecture	PPT & White board
1.4	Working with functions	2	Chalk & Talk	Smart Board
1.5	Advanced JavaScript Coding	1	Discussion	Black Board
1.6	Document Object Model	1	Lecture	Google classroom
1.7	Finding your Elements	1	Lecture	PPT & White board
1.8	Document Object Model form data	2	Lecture	Google classroom
UNIT - 2 JQUERY				
2.1	Using jQuery	1	Lecture	PPT
2.2	Loading the jQuery library, Functions	2	Chalk & Talk	PPT

2.3	Finding elements, Replacing data	2	Lecture	Smart Board
2.4	Changing styles, Reacting to events with JavaScript and jQuery	1	Lecture	Black Board
2.5	Understanding events	2	Discussion	Google classroom
2.6	Focusing on JavaScript and events	2	Lecture	Black Board
2.7	Looking jQuery and events	2	Chalk & Talk	PPT
UNIT – 3 INTRODUCING PHP				
3.1	Understanding PHP Basics, Benefits	2	Chalk & Talk	Black Board
3.2	Variable, Operators	2	Chalk & Talk	LCD
3.3	Including files	2	Lecture	PPT & White board
3.4	PHP Flow Control, Looping	2	Lecture	Smart Board
3.5	Building own functions	2	Lecture	Black Board
3.6	Event driven PHP	2	Discussion	Google classroom
UNIT - 4 PHP LIBRARIES				
4.1	PHP Libraries, Text Functions	2	Chalk & Talk	Black Board

4.2	Math Functions	2	Chalk & Talk	LCD
4.3	Date and time functions	2	Lecture	PPT&White board
4.4	Sessions and carts	2	Lecture	Smart Board
4.5	Storing Persistent Data	2	Lecture	Black Board
4.6	PHP and cookies, PHP and Sessions	2	Discussion	Google classroom
UNIT – 5 INTRODUCING MYSQL				
5.1	Designing and building a database	2	Chalk & Talk	Black Board
5.2	Creating databases, Building tables	2	Chalk & Talk	LCD
5.3	Using the database, Working with data	2	Lecture	PPT &White board
5.4	Searching for data	2	Lecture	Smart Board
5.5	Communicating with the database from PHP Scripts, Database support in PHP	2	Lecture	Black Board
5.6	Using mysqli library	2	Discussion	Google classroom

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	**45**
Non Scholastic	**5**
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

K2-*Understand*, **K3**-*Apply*, **K4**-*Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

                                                                        Nos

C1   –   Test (CIA 1)   2*   -   10 Mks

C2   -   Test (CIA 2)   1   -   15 Mks

C3   -   Assignment / Open Book Test   2   -   10 Mks

C4   -   Seminar   1   -   10 Mks

C5   -   Attendance   1   -   5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Use knowledge of JavaScript to create personal and/or business websites	K2, K4	PSO1 & PSO2
CO 2	Create effective scripts using jQuery to enhance the end user experience.	K2, K3, K4	PSO1 & PSO2
CO 3	Write PHP scripts to handle HTML forms.	K2 , K4	PSO1 & PSO3
CO 4	Use PHP built-in functions and custom functions for processing.	K2, K3,K4 & K5	PSO1 & PSO3
CO 5	Test, debug, and deploy web pages containing PHP and MySQL.	K2,K3,K4 & K5	PSO4 & PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	1	1	1
CO2	3	2	1	1	1
CO3	2	1	2	1	1
CO4	2	1	3	1	1
CO5	1	1	1	2	3

Mapping of C0s with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	1	2	3	1	2	1	2
CO2	3	2	2	1	1	1	2	3	1	2	1	2
CO3	3	2	3	2	2	2	2	3	2	2	1	3
CO4	3	3	3	2	3	3	2	3	3	2	1	3
CO5	3	3	3	3	3	2	2	3	2	2	3	3

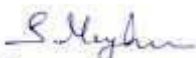**Note**:   ♦ Strongly Correlated – **3**   ♦ Moderately Correlated – **2**
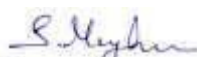
♦ Weakly Correlated -**1**

COURSE DESIGNER   **Forwarded By**

S. MARY HELAN FELISTA   **HOD'S Signature & Name**

(S. MARY HELAN FELISTA)   (S. MARY HELAN FELISTA)

SKILL DEVELOPMENT – 100%

<u>GENERAL ELECTIVE - MCA</u>

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	23MCAGE14	**FOUNDATION OF DATA SCIENCE**	**GENERAL ELECTIVE**	4	4

COURSE DESCRIPTION

This course provides basic knowledge about Data Science to succeed as a Data Analyst. It includes the fundamentals of modeling methods to model data and provides basic introduction to R Language & Probability distribution.

COURSE OBJECTIVE

❖ To understand the data science fundamentals and process.

❖ To learn to describe the data for the data science process.

❖ To learn to describe the relationship between data using modelling methods.

❖ To utilize the R Language in Data Handling.

UNIT- I INTRODUCTION TO DATA SCIENCE   **(12 Hours)**

Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – introduction to NoSQL.

SELF STUDY: working with data from files

UNIT- II MODELING METHODS   **(12 Hours)**

Choosing and evaluating models – mapping problems to machine learning, evaluating clustering models, validating models – cluster analysis – K-means algorithm, Naïve Bayes – Memorization Methods – Linear and logistic regression – unsupervised methods.

SELF STUDY:cluster analysis

UNIT- III INTRODUCTION TO R LANGUAGE   (12 Hours)

Reading and getting data into R – ordered and unordered factors – arrays and matrices – lists and data frames – reading data from files.

SELF STUDY: List

UNIT- IV PROBABILITY DISTRIBUTIONS   (12 Hours)

Statistical models in R - Binomial, Poisson, Normal distributions – Manipulating objects – data distribution.

SELF STUDY: Normaldistributions

UNIT- V DELIVERING RESULTS   (12 Hours)

Documentation and deployment – producing effective presentations– Introduction to graphical analysis – plot() function – displaying multivariate data – matrix plots – multiple plots in one window - exporting graph - using graphics parameters-Case studies.

SELF STUDY: Case studies

REFERENCES:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016.
2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017.
3. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016.

WEB REFERENCES:

1. file:///C:/Users/91984/Downloads/R_Notes.pdf
2. https://www.notesforgeeks.in/2023/01/cs3352-syllabus-foundations-of-data-science-2021-regulation-anna-university.html

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO DATA SCIENCE				
1.1	Data science process	2	Chalk & Talk	Black Board
1.2	roles, stages in data science project	2	Chalk & Talk	Black Board
1.3	working with data from files – working with relational databases	2	Lecture	White board
1.4	exploring data – managing data	2	Chalk & Talk	Black Board
1.5	cleaning and sampling for modeling and validation	2	Discussion	Black Board
1.6	introduction to NoSQL	2	Lecture	White board
UNIT - 2 MODELING METHODS				
2.1	Choosing and evaluating models	2	Lecture	PPT
2.2	mapping problems to machine learning	2	Chalk & Talk	Black Board
2.3	evaluating clustering models, validating models	2	Lecture	PPT
2.4	cluster analysis – K-means algorithm	2	Lecture	White board
2.5	Naïve Bayes – Memorization Methods	2	Discussion	Black Board
2.6	Linear and logistic regression – unsupervised methods.	2	Chalk & Talk	Black Board

UNIT – 3 INTRODUCTION TO R LANGUAGE				
3.1	Reading and getting data into R	2	Lecture	White board
3.2	ordered and unordered factors	2	Chalk & Talk	Black Board
3.3	arrays and matrices	3	Lecture	PPT
3.4	lists and data frames	3	Lecture	White board
3.5	reading data from files	2	Discussion	Black Board
UNIT - 4 PROBABILITY DISTRIBUTIONS				
4.1	Statistical models in R	3	Lecture	PPT
4.2	Binomial, Poisson, Normal distributions	3	Lecture	PPT
4.3	Manipulating objects	3	Chalk & Talk	Black Board
4.4	data distribution	3	Chalk & Talk	Black Board
UNIT – 5 DELIVERING RESULTS				
5.1	Documentation and deployment	2	Chalk & Talk	Black Board
5.2	producing effective presentations	2	Lecture	PPT
5.3	Introduction to graphical analysis	2	Lecture	PPT
5.4	plot() function – displaying multivariate data	2	Lecture	White board
5.5	matrix plots	1	Lecture	White board
5.6	multiple plots in one window - exporting graph	2	Lecture	White board
5.7	using graphics parameters	1	Lecture	White board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

   K2**-Understand,*** ***K3**-Apply***,*** ***K4**-Analyse, **K5** – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

			Nos		
C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- •**The Average of two will be taken into account**

CIA	
Scholastic	45
Non Scholast	5
	50

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Define the data science process	K2, K4	PSO1& PSO2
CO 2	Understand different models for data description for data science process	K2, K3, K4	PSO2 & PS03
CO 3	Gain knowledge on R Language	K2 , K4	PSO1 & PS04
CO 4	Use different techniques in Probability Distribution	K2, K3,K4& K5	PS03 & PS05
CO 5	Discuss the methods available for Delivering results	K2,K3,K4& K5	PS04 &PS05

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	1	3	2	1	1
CO3	2	1	1	3	1
CO4	1	1	3	1	2
CO5	1	1	1	2	3

Note: ◆ Strongly Correlated – **3**   ◆ Moderately Correlated – **2**

◆ Weakly Correlated -**1**

Mapping of COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3	1	1	1	1	1	2	1	1	1
CO2	1	2	1	1	3	1	1	1	1	1	1	1
CO3	1	3	1	1	1	2	1	1	1	1	1	1
CO4	1	1	1	2	1	1	3	1	1	1	1	1
CO5	3	1	1	1	1	1	1	1	1	2	1	1
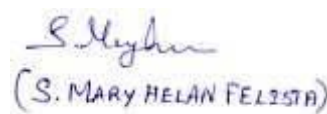
COURSE DESIGNER   **Forwarded By**

P.NANCY VINCENTINA MARY   **HOD'S Signature & Name**

P. Nancy

S. Myhu
(S. MARY HELAN FELISTA)

GENERAL ELECTIVE - MCA

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	23MCAGE15	HIGH SPEED NETWORKING PRINCIPLES	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course covers the basics, architectures, protocols and technologies for high-speed networks. It includes LANs, Protocols, TCP/IP Suite, Data Networks, high speed LANs, link level flow and error control, transport level traffic control, routing, MPLS switching and Network security.

COURSE OBJECTIVE

❖ To highlight the features of different technologies involved in High Speed Networking and their Performance.

❖ To facilitate on the basis of ATM and Frame Relay concepts and their applications.

❖ To learn about the various high speed digital access and broadband technologies &Switching techniques.

UNIT - I PACKET SWITCHING (12 Hours)

Packet Switching Networks – Frame Relay Networks - Asynchronous Transfer Mode - ATM Protocol Architecture - ATM Logical Connections – ATM cell – ATM

Service Categories – AAL - Fast Ethernet – Gigabit Ethernet – Fiber Channel – Wireless LANS – Applications – Requirements – Architecture of 802.11 – Services – Protocol layers

SELF STUDY: Asynchronous Transfer Mode

UNIT - II   **(12 Hours)**

QUEUING ANALYSIS, CONGESTION CONTROL IN DATA NETWORKS AND INTERNETS

Queuing analysis – Queuing Models – Single Server Queues – Multi Server Queues Effects of Congestion – Congestion control – Traffic Management – Congestion control in Packet Switching Networks – Frame relay Congestion control.

SELF STUDY: Congestion control

UNIT - III TCP   **(12 Hours)**

TCP Flow control – TCP Congestion control – Retransmission – Timer Management – Exponential RTO Hackoff – KARN's Algorithm – Window Management – Performance of TCP over ATM

SELF STUDY: Window Management

UNIT - IV INTEGRATED AND DIFFERENTIATED SERVICES   **(12 Hours)**

Integrated Services Architecture – Approach – Components – Services – Queuing – Discipline – FQ – PS – BRFQ – GPS – WFQ – Random Early Detection – Differentiated services

SELF STUDY: GPS

UNIT - VPROTOCOLS FOR QOS SUPPORT   **(12 Hours)**

RSVP – Goals & Characteristics – Data flow – RSVP operations – Protocol Mechanisms –Multiprotocol Label Switching – operations – Label Stacking and Protocol details – RTP – Protocol Architecture, Data transfer Protocol, RTCP

SELF STUDY: Data flow

REFERENCES :

1. William Stallings, "High Speed Networks and Internet", Pearson Education,. Second Edition, 2012.

2. Data Communication and Networking, BEHROUZ A FOROUZAN, 4th Edition, Tata Mc Graw Hill.

3. High Speed Networking Technology, Harry J. R. Dutton, Harry, Jr. Dutton, Peter Lenhard, Prentice Hall, 2016.

4. Planning and Designing High Speed Networks, Costa, Hewlett-Packard Company, Prentice Hall, 2016.

WEB REFERENCES:

1. https://www.hi-speed.net.au
2. https://sterbenz.org/jpgs/tutorials/hsn

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT 1 PACKET SWITCHING				
1.1	Packet Switching Networks – Frame Relay Networks	1	Lecture	Black Board
1.2	Asynchronous Transfer Mode - ATM Protocol Architecture	1	Lecture	White board
1.3	ATM Logical Connections	1	Lecture	PPT
1.4	ATM cell	1	Lecture	PPT
1.5	ATM Service Categories – AAL - Fast Ethernet	2	Lecture	PPT
1.6	Gigabit Ethernet – Fiber Channel	2	Lecture	White board
1.7	Wireless LANS – Applications	2	Lecture	PPT
1.8	Requirements – Architecture of 802.11	1	Chalk & Talk	Black Board
1.9	Services – Protocol layers	1	Lecture	PPT
UNIT 2 QUEUING ANALYSIS, CONGESTION CONTROL IN DATA NETWORKS AND INTERNETS				
2.1	Queuing analysis – Queuing Models	2	Lecture	PPT
2.2	Single Server Queues	2	Chalk & Talk	Black Board
2.3	Multi Server Queues Effects of Congestion	2	Lecture	PPT
2.4	Traffic Management	2	Lecture	White board
2.5	Congestion control in Packet Switching Networks	2	Discussion	Black Board
2.6	Frame relay Congestion control	2	Chalk & Talk	Black Board
UNIT 3 TCP				

3.1	TCP Flow control	2	Lecture	White board
3.2	TCP Congestion control	2	Chalk & Talk	Black Board
3.3	Retransmission	2	Lecture	PPT
3.4	Timer Management	2	Lecture	White board
3.5	Exponential RTO Hackoff – KARN's Algorithm	2	Discussion	Black Board
3.6	Performance of TCP over ATM	2	Lecture	PPT
UNIT 4 INTEGRATED AND DIFFERENTIATED SERVICES				
4.1	Integrated Services Architecture	2	Lecture	PPT
4.2	Approach – Components – Services	2	Lecture	PPT
4.3	Queuing – Discipline	2	Discussion	Black Board
4.4	FQ – PS – BRFQ	2	Lecture	PPT
4.5	WFQ – Random Early Detection	2	Chalk & Talk	White board
4.6	Differentiated services	2	Lecture	White board
UNIT 5 PROTOCOLS FOR QOS SUPPORT				
5.1	RSVP – Goals & Characteristics	2	Lecture	PPT
5.2	RSVP operations – Protocol Mechanisms	2	Lecture	PPT
5.3	Protocol Mechanisms-Multiprotocol Label Switching	2	Chalk & Talk	PPT
5.4	operations – Label Stacking and Protocol details – RTP	2	Lecture	PPT
5.5	Protocol Architecture, RTCP	4	Discussion	White board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment

	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5 Mks .	50 Mks .	
K1	-	-	-	-	-		-	-
K2	-	5	5	2.5	12.5		12.5	25%
K3	5	-	-	5	10		10	20%
K4	5	5	-	2.5	12.5		12.5	25%
K5	-	5	5	-	10		10	20%
Non-Scho.	-	-	-	-	-	5	5	10%
Total	10	15	10	10	45	5	50	100%

CIA	
Scholastic	**45**
Non Scholastic	**5**
	50

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for MCA are :**

  ***K2**-Understand**,** **K3**-Apply**,** **K4**-Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
10	15	10	10	5	50	50	100

- **CIA Components**

			Nos		
C1	–	Test (CIA 1)	2*	-	10 Mks
C2	-	Test (CIA 2)	1	-	15 Mks
C3	-	Assignment / Open Book Test	2	-	10 Mks
C4	-	Seminar	1	-	10 Mks
C5	-	Attendance	1	-	5 Mks

- **The Average of two will be taken into account**

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the building blocks and operation of high speed networking and ATM.	K2, K4	PSO1 & PSO2
CO 2	Analyze the cause of congestion, traffic slow down and related factors for Quality of Service.	K2, K3, K4	PSO1 & PSO2
CO 3	Apply the concepts learnt in this course to optimize performance of high-speed networks using Flow Control.	K2 , K4	PSO1 & PSO3
CO 4	Compare the different architectures used for HSN.	K2, K3,K4 & K5	PSO1 & PSO4
CO 5	Describe the protocols that are used to design high speed networks.	K2,K3,K4 & K5	PSO1 & PSO5

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	2	3	1	1	1
CO3	2	1	3	1	1
CO4	3	1	1	2	1
CO5	2	1	1	1	3

Mapping of COs with POs

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	1	2	2	2	1	1	1	2
CO2	2	2	2	1	1	2	2	2	2	2	1	2
CO3	2	2	2	1	2	2	2	2	1	2	1	2
CO4	2	2	2	1	1	3	2	3	1	2	2	3
CO5	3	3	3	2	2	3	3	3	3	3	3	3

Note: ϕ Strongly Correlated – **3**   ϕ Moderately Correlated – **2**

ϕ Weakly Correlated -**1**

COURSE DESIGNER: **Forwarded By**

B. USHA   **HOD'S Signature & name**

Usha .B

S. Myhn
(S. MARY HELAN FELISTA)