

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

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 Systems	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	1	25	25	50
SEMESTER - II						
20MCA201	DataStructuresandAlgorithms	4	4	50	50	100
23MCA202	Computer Networks & Communication	4	4	50	50	100
23MCA203	Programming in Java	4	4	50	50	100
*	ElectiveII– Specialization	4	4	50	50	100
*	ElectiveI–General	4	4	50	50	100
20MCA204	LabIII–WebTechnologies	4	2	50	50	100
23MCA205	Lab IV - Java Programming	6	3	50	50	100
20MCA206	SkillBasedLabII – RProgramming	2	1	25	25	50
20MCA207	Soft Skills II- Aptitude Training	2	2	25	25	50

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
SEMESTER - III						
20MCA301	Internship &Mini Project	4	4	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	6	3	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
SEMESTER - IV						
*	Elective III – General (Self Learning)	4	4	50	50	100
20MCA402	Project Viva Voce	-	6	50	50	100

ELECTIVES

SPECIALIZATION ELECTIVE - DATAANALYTICS

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 – DISTRIBUTED 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

GENERALECTIVES

S. NO	COURSECODE	COURSETITLE	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	-	-	-

I MCA
SEMESTER – I

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCA101	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides the logical, analytical and mathematical concepts that are fundamental for Computer Science

COURSE OBJECTIVE

- ❖ To impart the basic Foundation of mathematics for Computer Science.
- ❖ To introduce the concept of propositional and predicate logic and their applications.
- ❖ To inculcate logical thinking and promote arithmetic knowledge

UNIT- IMATHEMATICAL LOGIC

(12 Hours)

Introduction – Propositional calculus – Propositional variables and constants – Logical connectives and compound proposition – Basic Logical Operations – Conjunction – Disjunction – Negation – Derived Connectives – Statements generated by a set – Conditional Statements – Converse, Inverse and Contra-positive Statements – Converse Statements – Inverse Statements – Contra-positive Statements – Bi conditional statements – Negation of Bi Conditional Statements

SELF STUDY: Bi conditional statements – Negation of Bi Conditional Statements

UNIT- II

(12 Hours)

THE SOLUTION OF NUMERICAL ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Introduction – The Bisection method – Iteration method – The method of False Position (No derivations)

SELF STUDY: The method of False Position

UNIT – III STATISTICS

(12 Hours)

Measures of Central Tendency – Mean – Median-Mode – Karl Pearson's coefficient – Derivations are taken from assumed mean – Correlation of Bi-variate grouped Data – Rank Correlation Coefficient

SELF STUDY: Median-Mode

UNIT – IV SET THEORY ^ MATRICES

(12 Hours)

Introduction – Set and its elements – Standard Sets and Symbols – Set Description – Cardinal number of a set – Types of Sets – Venn – Euler diagram – Set Operations and Laws of Set Theory – Union of Sets – Intersection of Sets – Disjoint Sets – Difference of Two Sets – Complement of a Set – Distributive Laws – De Morgan's Laws

MATRICES

Introduction – Algebra of Matrices – Types of Matrices – Rank of a Matrix – Inverse of Matrix – Cayley Hamilton – Eigen Values and Eigen Vectors (Only Problems)

SELF STUDY: Standard Sets and Symbols – Set Description – Rank of a Matrix

UNIT V GRAPH THEORY

Basic concepts of Graphs, Sub Graphs, Matrix Representation of Graphs, Isomorphic graphs, Paths and Circuits – Eulerian Graphs – Hamiltonian Graphs – Planar Graphs – Euler's Formula – Regular & Bipartite Graphs – Graph Coloring – covering and Chromatic Numbers

SELF STUDY: Regular & Bipartite Graphs

REFERENCES:

1. J.K. Sharma, "Discrete Mathematics", MacMillan Publications, 3rd Edition , 2011.
2. Dr.M.K.Venkataraman, "Numerical Methods in Science and Engineering", The National Publishing Company, 5th Edition ,2001
3. Dr.S.P.Gupta&M.P.Gupta, "Business Statistics", Sultan Chand & Sons, 18th edition, 2014
4. Dr.S.Arumugam, A.T.Isaac, "Modern Algebra", SciTech Publications India Pvt. Ltd, 2016
5. Dr.S.P.Gupta&M.P.Gupta, "Business Statistics", Sultan Chand& Sons , 15th Edition, 2008.
6. J.P. Tremblay & R. Manohar, "Discrete Mathematical Structures with applications to Computer Science", Tata McGraw – Hill publishing, New Delhi, Reprint 2015.
7. Dr.S.Arumugam, A.T.Isaac, "Numerical Methods", SciTech Publications India Pvt. Ltd, 2nd Edition, 2015.
8. Narsingh Deo, "Graph Theory ". Prentice Hall of India,

WEB REFERENCES:

1. www.britannica.com/science/set-theory
2. <https://www.khanacademy.org/math/precalculus/precalc-matrices>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 Mathematical Logic				
1.1	Introduction – Propositional calculus - Propositional variables and constants	1	Lecture	Black Board
1.2	Logical connectives and compound proposition – Basic Logical Operations - Conjunction – Disjunction – Negation	2	Chalk & Talk	White board
1.3	Statements generated by a set – Conditional Statements	1	Chalk & Talk	Black Board
1.4	Converse, Inverse and Contra-positive Statements	2	Chalk & Talk	Black Board
1.5	Converse Statements – Inverse Statements	2	Chalk & Talk	Black Board
1.6	Contra-positive Statements	2	Chalk & Talk	White board
1.7	Bi conditional statements - Negation of Bi Conditional Statements	2	Chalk & Talk	White board
UNIT 2 - The Solution of Numerical Algebraic and Transcendental Equations				
2.1	Introduction	1	Chalk & Talk	Black Board
2.2	The Bisection method	4	Chalk & Talk	Black Board
2.3	Iteration method	4	Chalk & Talk	Black Board
2.4	The method of False Position	3	Chalk & Talk	Black Board
UNIT 3 – Statistics				
3.1	Measures of Central Tendency	2	Lecture	White board
3.2	Mean, Median, Mode	3	Chalk & Talk	Black Board
3.3	Karl Pearsons's coefficient	2	Chalk & Talk	Black Board
3.4	Derivations from assumed mean	1	Chalk & Talk	Black Board
3.5	Correlation of Bi-variate grouped Data	2	Chalk & Talk	Black Board
3.6	Rank Correlation Coefficient	2	Chalk & Talk	Black Board
UNIT 4 -Set Theory & Matrices				
4.1	Introduction – Set and its elements - Standard Sets and Symbols Set Description	1	Lecture	PPT
4.2	Cardinal number of a set – Types of Sets - Venn – Euler diagram	1	Lecture	Black Board
4.3	Set Operations and Laws of Set Theory – Union of Sets – Intersection of Sets - Disjoint Sets –	2	Chalk & Talk	Black Board

	Difference of Two Sets – Complement of a Set			
4.4	Distributive Laws – De Morgan’s Laws	2	Chalk & Talk	Black Board
4.5	Matrices - Introduction – Algebra of Matrices – Types of Matrices- Rank of a Matrix	2	Chalk & Talk	Black Board
4.6	Inverse of Matrix – Cayley Hamilton	2	Chalk & Talk	Black Board
4.7	Eigen Values and Eigen Vectors	2	Chalk & Talk	Black Board
UNIT -5 Graph Theory				
5.1	Basic concepts of Graphs, Sub Graphs	2	Chalk & Talk	Black Board
5.2	Matrix Representation of Graphs, Isomorphic graphs	2	Chalk & Talk	Black Board
5.3	Paths and Circuits – Eularian Graphs	2	Chalk & Talk	Black Board
5.4	Hamiltonian Graphs – Planar Graphs	2	Chalk & Talk	Black Board
5.5	Euler’s Formula – Regular & Bipartite Graphs	2	Chalk & Talk	Black Board
5.6	Graph Coloring – covering and Chromatic Numbers	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	10 Mks	15 Mks	5+5=10Mks	10 Mks	45 Mks .	5Mks .	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	Perform Logical operations and predicate calculus needed for computing skill.	K2, K4	PSO1 & PSO2
CO 2	Analyze and Compare the various techniques for solving numerical equations	K2, K3, K4	PSO1 & PSO2
CO 3	Apply the techniques of statistics and numerical methods to unravel problems by computers.	K2 , K4	PSO1 & PSO3
CO 4	Explain the set theory logic & the Knowledge of matrices for designing and solving problems	K2, K3,K4& K5	PSO1 & PSO4
CO 5	Apply the techniques of graph theory to solve real life 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

Staff Name – B. USHA

HOD'S Signature

 -B


(S. MARY HELAN FELISTA)

EMPLOYABILITY-100%

I MCA

SEMESTER – I

(For those who join in 2023 onwards)

PROGRAMM E CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDIT S
MCA	23MCA10 2	RELATIONAL DATABASE MANAGEMEN T 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 - III POSTGRESQL 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 ADVANCED POSTGRESQL

(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 Query Languages	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 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	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

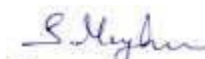
♦ Weakly Correlated -1

Mapping of COs 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

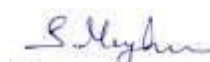
COURSE DESIGNER:

S. MARY HELAN FELISTA


(S. MARY HELAN FELISTA)

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)

SKILL DEVELOPMENT-100%

I MCA

SEMESTER – I

(For those who joined in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCA103	OPERATING SYSTEMS	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides knowledge on the concepts of abstraction, scheduling mechanisms, implementations and manages a computer's resources, especially the allocation of those resources among other programmes.

COURSE OBJECTIVES

- ❖ To be aware of the evolution and fundamental principles of operating system.
- ❖ To understand the various operating system components like process management, memory management, file management.
- ❖ To be familiar with storage management.

UNIT - I INTRODUCTION

(12 Hours)

What Operating Systems Do – System Organization – System Architecture – System Structure – Protection and Security – Open Source Operating Systems– Process Concept – Process Scheduling –Operations on Processes – Inter process Communication.

SELF STUDY: Inter process Communication

UNIT – II PROCESS SYNCHRONIZATION & SCHEDULING (12 Hours)

Critical Section Problem – Peterson's Solution - Synchronization Hardware – Semaphores – Classic Problems of Synchronization– Monitors –CPU Basic Concepts – Scheduling Criteria – Scheduling Algorithms

SELF STUDY: Monitors

UNIT – III DEADLOCK&MEMORY MANAGEMENT (12 Hours)

Deadlock System Model – Deadlock Characterization – Methods for Handling – Prevention – Avoidance – Detection – Recovery from Deadlock.

Memory Management – Background – Swapping – Contiguous Memory Allocation – Segmentation –Paging – Structure of Page Table.

SELF STUDY: Segmentation.

UNIT - IV VIRTUAL MEMORY &STORAGE MANAGEMENT(12 Hours)

Virtual Memory –Demand Paging –Copy-on-Write – Page Replacement. Disk Structure – Disk Attachment - Disk Scheduling – Disk Management – Swap-Space Management – RAID Structure

SELF STUDY: Demand Paging

UNIT – V FILE SYSTEM INTERFACE & IMPLEMENTATION(12 Hours)

File Concept – Access Methods – Directory and Disk Structure – File system mounting – File sharing – File System Structure – File System Implementation – Directory Implementation - Allocation Methods – Free Space Management

SELF STUDY: Swap-Space Management

REFERENCES:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, “Operating System Principles”, Wiley Publication, 9th Edition, 2013.
2. William Stallings, “Operating Systems: Internals and Design Principles”, Prentice Hall, 9th Edition, 2018.
3. Madnick&J.Donovan, "Operating Systems", McGraw, Hill Publication, 2nd Edition, 2013.
4. H.M.Deitel, "Operating systems", Addison Wesley Publication, 3rd Edition, 2013.
5. William Stallings, "Operating Systems ", Prentice Hall Publication, 7th Edition, 2014.

WEB REFERENCES:

1. <http://Williamstallings.com/os/animations>
2. https://www.tutorial.com/operating_system/

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	What Operating Systems Do – System Organization	1	Chalk & Talk	Black Board
1.2	System Architecture	1	Chalk & Talk	LCD
1.3	System Structure	4	Lecture	PPT & White board
1.4	Protection and Security	1	Lecture	Smart Board
1.5	Open Source Operating Systems –Process Concept	1	Lecture	Black Board
1.6	Process Scheduling –Operations on Processes	2	Discussion	Google classroom
1.7	Inter process Communication	2	Lecture	PPT & White board
UNIT -2 PROCESS SYNCHRONIZATION & SCHEDULING				
2.1	Critical Section Problem	1	Lecture	Green Board Charts
2.2	Peterson’s Solution	2	Chalk & Talk	Green Board
2.3	Synchronization Hardware	1	Lecture	Smart Board
2.4	Semaphores	1	Lecture	Black Board
2.5	Classic Problems of Synchronization	2	Discussion	Google classroom
2.6	Monitors	1	Lecture	Green Board Charts
2.7	CPU Basic Concepts	2	Chalk & Talk	Green Board
2.8	Scheduling Criteria	1	Lecture	Smart Board
2.9	Scheduling Algorithms	1	Lecture	Black Board

UNIT –3 DEADLOK &MEMORY MANAGEMENT				
3.1	Deadlock System Model – Deadlock Characterization	1	Chalk & Talk	Black Board
3.2	Methods for Handling	1	Chalk & Talk	LCD
3.3	Prevention – Avoidance	3	Lecture	PPT & White board
3.4	Detection – Recovery from Deadlock	1	Lecture	Smart Board
3.5	Memory Management	1	Lecture	Black Board
3.6	Background – Swapping	1	Discussion	Google classroom
3.7	Contiguous Memory Allocation	2	Lecture	PPT & White board
3.8	Segmentation –Paging	1	Discussion	Black Board
3.9	Structure of Page Table	1	Lecture	Black Board
UNIT –4 VIRTUAL MEMORY &STORAGE MANAGEMENT				
4.1	File Concept – Access Methods	1	Chalk & Talk	Black Board
4.2	Directory and Disk Structure	1	Chalk & Talk	LCD
4.3	File system mounting	3	Lecture	PPT & White board
4.4	File sharing	1	Lecture	Smart Board
4.5	File System Structure	1	Lecture	Black Board
4.6	File System Implementation	1	Discussion	Google classroom
4.7	Directory Implementation	2	Lecture	PPT & White board
4.8	Allocation Methods, Free Space Management	2	Discussion	Black Board

UNIT – 5 FILE SYSTEM INTERFACE & IMPLEMENTATION				
5.1	Disk Structure & Attachment	2	Chalk &Talk	Black Board
5.2	Disk Scheduling	2	Chalk & Talk	LCD
5.3	Disk Management	1	Lecture	PPT & White board
5.4	RAID Structure	2	Lecture	Smart Board
5.5	I/O Systems	1	Lecture	Black Board
5.6	I/O Hardware	1	Discussion	Google classroom
5.7	I/O interface	1	Lecture	PPT & White board
5.8	I/O Subsystem	1	Discussion	Black Board
5.9	I/O Request to hardware operations	1	Lecture	Black 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 components and processes.	K2, K4	PSO1 & PSO2
CO 2	Analyse on scheduling algorithms and deadlocks.	K2, K3, K4	PSO1 & PSO2
CO 3	Demonstrate the mapping between the physical memory and virtual memory	K2 , K4	PSO1 & PSO4
CO 4	Identify the secondary memory management techniques	K2, K3,K4& K5	PSO1 & PSO3
CO 5	Analyse on the I/O systems	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	1	3	1
CO4	2	1	3	1	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	1	3	1	1	2	1	1	1	1	1	2	1
CO2	1	2	1	1	2	1	2	1	1	1	3	1
CO3	1	2	1	1	2	3	1	1	1	1	3	1
CO4	1	3	1	1	3	1	2	1	1	1	2	1
CO5	3	2	1	1	2	2	3	1	1	1	2	1

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

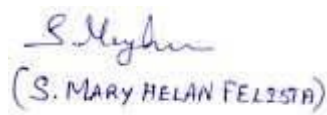
COURSE DESIGNER

S. JEBAPRIYA



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

EMPLOYABILITY-100%

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 Operations- 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 Operations- 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

Level s	C1	C2	C3	C4	Total Scholasti c Marks	Non Scholasti c Marks C5	CIA Tota l	% of Assessmen t
	10 Mk s	15 Mk s	5+5=1 0 Mks .	10 Mk s	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

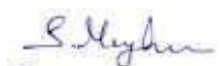
♦ Weakly Correlated -1

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

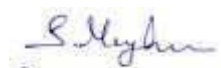
COURSE DESIGNER:

S. Mary Helan Felista


(S. MARY HELAN FELISTA)

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)

I MCA**SEMESTER – I****(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCADA01	DATA MINING TECHNIQUES	SPECIALIZATION ELECTIVE – DATA ANALYTICS	4	4

COURSE DESCRIPTION

This course provides the basic concepts, principles, methods, implementation techniques and applications of data mining.

COURSE OBJECTIVE

- ❖ To know then scope and necessity of Data mining for the Society.
- ❖ To understand & analyze the various algorithms for Knowledge Extraction.
- ❖ To acquire the basic knowledge of various data mining techniques through Weka tool.

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

What is Data Mining? , Data Mining: Definitions, KDD vs Data Mining, Stages of KDD, DBMS vs DM, Other Related Areas, DM Techniques, Other Mining Problems, Issues and Challenges in DM.

SELF STUDY:Issues and Challenges in DM

UNIT II

(12 Hours)

ASSOCIATION RULES:

What is an Association Rule?, Methods to discover Association Rules, A Priori Algorithm, Partition Algorithm, Pincer Search Algorithm, FP-tree Growth Algorithm, Discussion on different algorithms, Generalized Association Rule.

SELF STUDY: Discussion on different algorithms

UNIT III

(12 Hours)

CLUSTERING TECHNIQUES:

Clustering paradigms, Partitioning Algorithms, k-Medoid Algorithms, CLARA, CLARANS, Hierarchical Clustering, DBSCAN.

SELF STUDY: Hierarchical Clustering

UNIT IV

(12 Hours)

WEB MINING:

Web Mining, Web Content Mining, Web Structure Mining, Web Usage Mining, Text Mining.

TEMPORAL AND SPATIAL DATA MINING:

What is Temporal Data Mining? , Temporal Association Rules, Sequence Mining, The GSP Algorithm, SPIRIT, Spatial Mining, Spatial Mining Tasks, Spatial Clustering, Spatial Trends.

SELF STUDY: SPIRIT

UNIT V WEKA TOOL

(12 Hours)

Introduction, Launching Weka Explorer, Preprocessing Data, File conversion, Opening file from a local file system, Opening file from a web site, Reading data from a database, Preprocessing window, Building Classifiers, Clustering data, Finding associations, Attribute selection, Data visualization.

SELF STUDY : Preprocessing window

REFERENCES :

1. Arun K Pujari , “Data mining Techniques”, Universities Press (India) Private Limited, 2008
2. Jiawei Han, Micheline Kamber, Jian Pei, “Data mining Concepts and Techniques”, Third Edition, Morgan Kaufman Publishers, 2012.
3. Bharat Bhushan Agarwal, Sumit Prakash Tayal, “Data Mining and Data Warehousing”, Laxmi Publications Ltd., 2009
4. Margaret H , “Data Mining: Introductory And Advanced Topics”, Dunham Pearson Education India, 2006.
5. Usama M. Farrad, Geogory Piatetsky – Shapiro, Padhraí Smyth and Ramasamy Uthrusamy, “ Advances in Knowledge Discovery and Data Mining”, The M.I.T. Press 1996.

WEB REFERENCES:

1. https://www.tutorialspoint.com/data_mining
2. <http://people.sabanciuniv.edu/berrin/cs512/lectures>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	What is Data Mining? , Data Mining: Definitions	2	Lecture	PPT
1.2	KDD vs Data Mining	2	Lecture	PPT
1.3	Stages of KDD	2	Lecture	PPT
1.4	DBMS vs DM	2	Lecture	PPT
1.5	Other Related Areas, DM Techniques	1	Lecture	PPT
1.6	Other Mining Problems	1	Lecture	PPT
1.7	Issues and Challenges in DM	2	Lecture	PPT
UNIT 2 - ASSOCIATION RULES				
2.1	What is an Association Rule?, Methods to discover Association Rules	2	Lecture	PPT
2.2	A Priori Algorithm	2	Chalk & Talk	Black Board
2.3	Partition Algorithm	2	Lecture	PPT
2.4	Pincer Search Algorithm	2	Lecture	White board

2.5	FP-tree Growth Algorithm	2	Discussion	Black Board
2.6	Discussion on different algorithms, generalized Association Rule	2	Chalk & Talk	Black Board
UNIT 3 - CLUSTERING TECHNIQUES				
3.1	Clustering paradigms	2	Lecture	White board
3.2	Partitioning Algorithms	2	Chalk & Talk	Black Board
3.3	k-Medoid Algorithms	2	Lecture	PPT
3.4	CLARA, CLARANS	2	Lecture	PPT
3.5	Hierarchical Clustering	2	Lecture	White board
3.6	DBSCAN	2	Discussion	Black Board
UNIT 4 - WEB MINING & TEMPORAL AND SPATIAL DATA MINING				
4.1	Web Mining, Web Content Mining	1	Lecture	PPT
4.2	Web Structure Mining, Web Usage Mining	2	Lecture	White board
4.3	Text Mining , What is Temporal Data Mining?	2	Lecture	PPT
4.4	Temporal Association Rules , Sequence Mining	1	Lecture	PPT
4.5	The GSP Algorithm, SPIRIT	2	Lecture	White board

4.6	Spatial Mining, Spatial Mining Tasks	2	Lecture	PPT
4.7	Spatial Clustering, Spatial Trends	2	Lecture	White board
UNIT V WEKA TOOL				
5.1	Introduction, Launching Weka Explorer	1	Lecture	PPT
5.2	Preprocessing Data, File conversion	1	Demonstration	LCD
5.3	Opening file from a local file system, Opening file from a website	2	Demonstration	LCD
5.4	Reading data from a database, Preprocessing window	2	Demonstration	LCD
5.5	Building Classifiers, Clustering data	2	Demonstration	LCD
5.6	Finding associations, Attribute selection	2	Demonstration	LCD
5.7	Data visualization	2	Demonstration	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 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 Data Mining and various techniques to extract knowledge.	K2, K4	PSO2
CO 2	Analyze the methods to discover Association Rules	K2, K3, K4	PSO1 & PSO2
CO 3	Design & deploy the appropriate Clustering techniques.	K2 , K4	PSO1 & PSO3
CO 4	Outline web mining, temporal and spatial data mining	K2, K3,K4& K5	PSO1 & PSO4
CO 5	Examine and Explore weka techniques	K2,K3,K4& K5	PSO2

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	3	1	2	1	1
CO4	3	1	1	2	1
CO5	1	1	2	3	1

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12
CO1	1	2	3	3	3	1	2	2	1	2	1	2
CO2	2	2	3	2	2	3	3	1	1	2	1	1
CO3	1	3	3	3	3	2	2	1	2	2	1	1
CO4	2	2	2	3	3	2	3	2	1	2	1	2
CO5	3	2	2	2	1	3	3	2	1	2	1	2

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

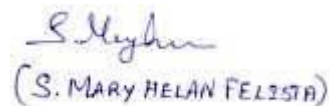
♦ Weakly Correlated -1

COURSE DESIGNER:

Forwarded By

Staff Name – R.SMEETA MARY

HOD'S Signature & Name



 (S. MARY HELAN FELISTA)

I MCA**SEMESTER – I****For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCADA02	DATA ANALYTICS AND VISUALIZATION USING SPREADSHEETS	SPECIALIZATION ELECTIVE – DATA ANALYTICS	4	4

COURSE DESCRIPTION

This course provides knowledge to perform data analysis using Excel's most popular features.

COURSE OBJECTIVE

- ❖ Learn about the pivot tables in Spreadsheet
- ❖ Provide knowledge on Data Checking and Evaluation.
- ❖ Perform Data Analysis and Evaluation

UNIT I**Introducing Spreadsheet**

Building Tables - Analyzing Table Information

Grabbing Data from External Sources

Getting Data the Export - Import Way - Querying External Databases and Web Page Tables

UNIT II

Cleaning Data

Editing Your Imported Workbook - Cleaning Data with Text Functions

Working with PivotTables

Looking at Data from Many Angles - Running the PivotTable Wizard- Customizing How Pivot Tables Work and Look

UNIT III

Building PivotTable Formulas

Adding Another Standard Calculation - Creating Custom Calculations - Using Calculated Fields and Items - Retrieving Data from a Pivot Table

Working with PivotCharts

Running the PivotTable Wizard - Fooling Around with Your Pivot Chart.

Customizing PivotCharts

Selecting a Chart Type - Working with Chart Styles - Changing Chart Layout - Changing a Chart's Location - Formatting the Plot Area - Formatting the Chart Area

UNIT IV

Using the Database Functions

Using the DAVERAGE Function -Using the DCOUNT and DCOUNTA Functions- Using the DGET Function - Using the DMAX and DMAX Functions - Using the DPRODUCT Function - Using the DSTDEV and DSTDEVP Functions - Using the DSUM Function - Using the DVAR and DVARP Functions

Using the Statistics Functions

Counting Items in a Data Set - Means, Modes, and Medians - Finding Values, Ranks, and Percentiles - Standard Deviations and Variances - Regression Analysis – Correlation

UNIT V

Descriptive Statistics

Using the Descriptive Statistics Tool - Creating a Histogram - Ranking by Percentile - Calculating Moving Averages Exponential Smoothing - Generating Random Numbers - Sampling Data

Inferential Statistics

Using the t-test Data Analysis Tool - Performing z-test Calculations - Creating a Scatter Plot - Using the Regression Data Analysis Tool - Using the Correlation Analysis Tool - Using the Covariance Analysis Tool - Using the ANOVA Data Analysis Tools - Creating an f-test Analysis - Using Fourier Analysis

REFERENCES:

1. Stephen L. Nelson, and E. C. Nelson, “Excel Data Analysis For Dummies” , Second edition, John Wiley & Sons, Inc., 2014
2. Walkenbach, John, “Excel 2016 Bible” , John Wiley & Sons, Inc., 2015
3. Jelen, Bill, “Excel 2016 Pivot Table Data Crunching”, Pearson Education, Inc, 2016

WEB REFERENCES:

1. [owardsdatascience.com/data-analysis-using-excel-885f337c85c](https://towardsdatascience.com/data-analysis-using-excel-885f337c85c)
2. <https://people.umass.edu/evagold/excel.html>
3. <https://www.analyticsvidhya.com/blog/2020/04/excel-tips-tricks-data-analysis/>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 Introducing Excel Tables				
1.1	Introducing Spreadsheet	1	Lecture	PPT & White board
1.2	Building Tables	2	Lecture	Smart Board
1.3	Analyzing Table Information	1	Chalk & Talk	Black Board
1.4	Grabbing Data from External Sources	2	Lecture	PPT & White board
1.5	Getting Data the Export	2	Lecture	Smart Board
1.6	Import Way	2	Lecture	PPT & White board
1.7	Querying External Databases and Web Page Tables	2	Discussion	Google classroom
UNIT 2 - Cleaning Data & Working with PivotTables				
2.1	Cleaning Data	1	Lecture	PPT & White board
2.2	Editing Your Imported Workbook	2	Lecture	Smart Board
2.3	Cleaning Data with Text Functions	2	Chalk & Talk	Black Board
2.4	Working with PivotTables	1	Lecture	PPT & White board
2.5	Looking at Data from Many Angles	2	Lecture	PPT & White board
2.6	Running the PivotTable Wizard	2	Lecture	Smart Board
2.7	Customizing How Pivot Tables Work and Look	2	Chalk & Talk	Black Board
UNIT 3 – PivotTable &PivotCharts				
3.1	Building PivotTable Formulas	1	Lecture	Smart Board

3.2	Adding Another Standard Calculation	1	Chalk & Talk	Black Board
3.3	Creating Custom Calculations - Using Calculated Fields and Items	1	Lecture	PPT & White board
3.4	Retrieving Data from a Pivot Table	1	Discussion	Google classroom
3.5	Working with PivotCharts	1	Lecture	Smart Board
3.6	Running the PivotTable Wizard - Fooling Around with Your Pivot Chart.	2	Chalk & Talk	Black Board
3.7	Customizing PivotCharts	1	Lecture	PPT & White board
3.8	Selecting a Chart Type - Working with Chart Styles - Changing Chart Layout	2	Discussion	Google classroom
3.9	Changing a Chart's Location - Formatting the Plot Area - Formatting the Chart Area	2	Lecture	PPT & White board
UNIT 4 - Database Functions & Statistics Functions				
4.1	Using the Database Functions	1	Lecture	Smart Board
4.2	Using the DAVERAGE Function - Using the DCOUNT and DCOUNTA Functions	2	Lecture	Smart Board
4.3	Using the DGET Function - Using the DMAX and DMAX Functions - Using the DPRODUCT Function	2	Chalk & Talk	Black Board
4.4	Using the DSTDEV and DSTDEVP Functions - Using the DSUM Function - Using the DVAR and DVARP Functions	2	Lecture	PPT & White board
4.5	Using the Statistics Functions	1	Discussion	Google classroom
4.6	Counting Items in a Data Set - Means, Modes, and Medians	2	Lecture	Smart Board
4.7	Finding Values, Ranks, and Percentiles - Standard Deviations and Variances	1	Chalk & Talk	Black Board

4.8	Regression Analysis - Correlation	1	Lecture	PPT & White board
UNIT -5 Descriptive & Inferential Statistics				
5.1	Descriptive Statistics	1	Lecture	Smart Board
5.2	Using the Descriptive Statistics Tool - Creating a Histogram	2	Chalk & Talk	Black Board
5.3	Ranking by Percentile - Calculating Moving Averages Exponential Smoothing	2	Lecture	PPT & White board
5.4	Generating Random Numbers - Sampling Data	2	Discussion	Google classroom
5.5	Inferential Statistics	1	Lecture	Smart Board
5.6	Using the t-test Data Analysis Tool - Performing z-test Calculations	1	Chalk & Talk	Black Board
5.7	Creating a Scatter Plot - Using the Regression Data Analysis Tool - Using the Correlation Analysis Tool	1	Lecture	PPT & White board
5.8	Using the Covariance Analysis Tool - Using the ANOVA Data Analysis Tools - Creating an f-test Analysis - Using Fourier Analysis	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	Ability to analyze data is a powerful skill that helps you make better decisions	K2	PSO1 & PSO5
CO 2	Identify the basic principles of a Pivot Table	K2, K3	PSO1 & PSO2
CO 3	Recognize how to use Pivot Table and Pivot chart	K2 , K4	PSO3 & PSO4
CO 4	Use Excel's powerful functions to efficiently transform mountains of raw data into clear insights	K2,K3,K4	PSO4 & PSO5
CO 5	Use your new-found Excel skills like Descriptive Statistics and Inferential Statistics to analyze what makes a successful project.	K2,K5	PSO3 & PSO5

Mapping COs Consistency with PSOs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

Mapping of COs with POs

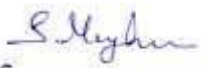
CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	2	2	2	3	1	1	1	2
CO2	3	2	2	2	2	2	2	3	1	1	1	2
CO3	3	3	3	2	2	3	2	3	1	2	1	2
CO4	3	3	3	2	3	3	2	3	2	2	1	3
CO5	3	3	3	3	3	3	3	3	2	3	3	3

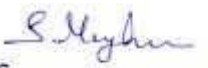
COURSE DESIGNER:

Forwarded By

Staff Name – S. MARY HELAN FELISTA

HOD'S Signature & Name


(S. MARY HELAN FELISTA)


(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	23MCADS01	DISTRIBUTED SYSTEMS	SPECIALIZATION ELECTIVE – DISTRIBUTED 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 2 PROCESS				
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	2	Lecture	White

	Distribution Transparency ,Servers			board
2.5	General Design Issues, Object Servers	2	Discussion	Black Board
2.6	Example: The Apache Web Server ,Server Clusters.	2	Lecture	PPT
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, Consistent Ordering of Operations	2	Chalk & Talk	Black Board
4.8	Eventual Consistency	1	Lecture	PPT
UNIT5SECURITY				
5.1	Introduction to Security, SecurityThreats, 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	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	Understand the design principles in distributed systems and the architectures for distributed systems.	K2, K4	PSO1, PSO2
CO 2	Apply various distributed algorithms related to clock synchronization, concurrency control, deadlock detection, load balancing, voting etc.	K2, K3, K4	PSO2, PSO3
CO 3	Analyze fault tolerance and recovery in distributed systems and algorithms for 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	PSO3, 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%

**I MCA
SEMESTER – I**

(For those who join in 2023 onwards)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WE EK	CREDIT S
MCA	23MCADS 02	SECURED WIRELESS COMMUNICATI ON	SPECIALIZATI ON 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 802.11 Layers – 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", Kazukuni Kobara, Artech House, 2007
2. Steve S. Thomas, "Wireless Communications Security", Create Space Independent Publishing, 2010.
3. Jyrki T. J. Penttinen, "Wireless 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](https://jwcn-urasipjournals.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 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, 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 COs 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:

B.USHA



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	20MCAA M01	ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS	SPECIALIZATION ELECTIVE – AI & MACHINE LEARNING	4	4

COURSE DESCRIPTION

This course provides the basic principles of artificial intelligence. It will cover problem solving paradigms, constraint propagation and search strategies in the areas of applications including knowledge representation, natural language processing, expert systems, vision and robotics.

COURSE OBJECTIVE

- ❖ To learn the methods of solving problems using Artificial Intelligence.
- ❖ To have an understanding of the basic issues of knowledge representation, blind and heuristic search.
- ❖ To have a basic proficiency in a traditional AI language and expert systems.

UNIT – I**(12 Hours)****AI PROBLEMS AND PROBLEM CHARACTERISTICS**

The AI Problems – The underlying assumption - AI techniques – The level of the model – Criteria for success - Problems , Problem space and search – Defining the problem as a state space search – Production Systems – Problem characteristics – Production system characteristics – Issues in the design of search programs- Additional problems.

SELF STUDY: Problem characteristics.

UNIT - II SEARCH TECHNIQUES (12 Hours)

Heuristic search techniques – Generate and test – Hill climbing – Best first search – Problem reduction – Constraint satisfaction – Means ends analysis. Knowledge Representation Issues- Representations and Mappings- Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem.

SELF STUDY: Constraint satisfaction.

UNIT - III USING PREDICATE LOGIC (12 Hours)

Using predicate logic – Representing simple facts in logic – Representing instance and ISA relationship – Computable functions and predicates – Resolution – Natural deduction - Representing knowledge – Using rules – Procedural versus declarative knowledge – Logic programming – forward versus backward reasoning – Matching – Control knowledge.

SELF STUDY: Natural deduction.

UNIT – IV FILLER STRUCTURE AND GAME PLAYING (12 Hours)

Weak Slot and Filler Structure - Semantic Nets – Frames - Strong Slot and Filler Structure - Conceptual Dependency – Scripts – CYC - Game playing- The minimax search procedure- Adding alpha beta cutoffs- additional refinements- Iterative Deepening.

SELF STUDY: Scripts.

UNIT - V AI LEARNING AND EXPERT SYSTEMS (12 Hours)

What is Learning – ROTE Learning - Learning by Taking Advice – Learning in Problem solving –Explanation-based Learning - Discovery – Analogy – Formal Learning Theory - Expert Systems – Representing and using domain knowledge – Expert System Shells – Explanation.

SELF STUDY: Knowledge Acquisition.

REFERENCE BOOKS:

1. Elaine Rich, Kevin Knight, "Artificial Intelligence", McGraw Hill Education Pvt Ltd., 3rdEdition, 2019.
2. Mishra Ravi Bhushan, "Artificial Intelligence", PHI learning Pvt. Ltd, 2011
3. Kaushik saroj, "Artificial Intelligence", Cengage learning India 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 AI PROBLEMS AND PROBLEM CHARACTERISTICS				
1.1	The AI Problems , The underlying assumption	2	Chalk & Talk	Black Board
1.2	AI techniques, The level of the model	2	Chalk & Talk	Black Board
1.3	Criteria for success ,Problems , Problem space and search	2	Lecture	White board
1.4	Defining the problem as a state space search ,Production Systems	2	Chalk & Talk	Black Board
1.5	Problem characteristics , Production system characteristics	2	Discussion	Black Board
1.6	Issues in the design of search programs, Additional problems.	2	Lecture	White board
UNIT 2 SEARCH TECHNIQUES				
2.1	Heuristic search techniques , Generate and test	2	Lecture	PPT
2.2	Hill climbing , Best first search, Problem reduction	3	Chalk & Talk	Black Board
2.3	Constraint satisfaction , Means ends analysis, Knowledge Representation Issues	2	Lecture	PPT
2.4	Representations and Mappings, Approaches to Knowledge Representation	3	Lecture	White board
2.5	Issues in Knowledge Representation , The Frame Problem.	2	Discussion	Black Board
UNIT3 USING PREDICATE LOGIC				
3.1	Using predicate logic , Representing simple facts in logic	1	Lecture	White board
3.2	Representing instance and ISA relationship	1	Chalk & Talk	Black Board
3.3	Computable functions and predicates	1	Lecture	PPT

3.4	Resolution , Natural deduction	1	Lecture	White board
3.5	Representing knowledge , Using rules	1	Discussion	Black Board
3.6	Procedural versus declarative knowledge	2	Lecture	PPT
3.7	Logic programming	1	Chalk & Talk	Black Board
3.8	Forward versus backward reasoning	2	Lecture	White board
3.9	Matching	1	Chalk & Talk	Black Board
3.10	Control knowledge	1	Chalk & Talk	Black Board
UNIT 4 FILLER STRUCTURE AND GAME PLAYING				
4.1	Weak Slot and Filler Structure , Semantic Nets	1	Lecture	PPT
4.2	Frames	2	Lecture	PPT
4.3	Strong Slot and Filler Structure, Conceptual Dependency	1	Chalk & Talk	Black Board
4.4	Scripts, CYC.	2	Chalk & Talk	Black Board
4.5	Game playing	1	Discussion	Black Board
4.6	The minimax search procedure	2	Lecture	PPT
4.7	Adding alpha beta cutoffs, additional refinements	2	Chalk & Talk	Black Board
4.8	Iterative Deepening.	1	Lecture	PPT
UNIT 5 AI LEARNING AND EXPERT SYSTEMS				
5.1	What is Learning , ROTE Learning	2	Chalk & Talk	Black Board
5.2	Learning by Taking Advice , Learning in Problem solving	2	Lecture	PPT
5.3	Explanation based Learning , Discovery	2	Lecture	PPT
5.4	Analogy , Formal Learning Theory	2	Lecture	White board
5.5	Expert Systems, Representing and using domain knowledge	2	Lecture	White board
5.6	Expert System Shells, Explanation	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	Explore problems that are amenable to solution by AI methods.	K2, K4	PSO1,PSO2
CO 2	Formulate search problems and implement search algorithms using admissible heuristics.	K2, K3, K4	PSO2, PSO3
CO 3	Design and carry out an empirical evaluation of different algorithms on a predicate logic and state the conclusions that the evaluation supports.	K2 , K4	PSO1, PSO3
CO 4	Analyze games playing as adversarial search problems and implement optimal and efficient solutions.	K2, K3, K4& K5	PSO4, PSO5
CO 5	Identify the concepts of Artificial Intelligence and Expert Systems.	K2,K3, K4& K5	PSO3, 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

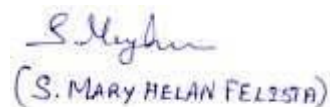
♦ Weakly Correlated -1

COURSE DESIGNER

Forwarded By

DR. R. SMEETA MARY

HOD'S Signature & Name



 (S. MARY HELAN FELISTA)

**I MCA
SEMESTER –I**

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAAM02	SOFT COMPUTING	SPECIALIZATION ELECTIVE – AI & MACHINE LEARNING	4	4

COURSE DESCRIPTION

This course provides the principal constituents of soft computing that is fuzzy logic, neural network theory and probabilistic reasoning. The course explores the features that are employed in various associated techniques.

COURSE OBJECTIVE

- ❖ To master the various fundamental models of artificial neural networks.
- ❖ To cater the knowledge of Neural Networks and use these for controlling real time systems.
- ❖ To use the fuzzy logic and neural network for application related to design and manufacture.

UNIT – I FUNDAMENTALS OF NEURAL NETWORKS

(12 Hours)

Basic Concepts of Neural Networks – Human Brain - Model of An Artificial Neuron – Neural Network Architectures –Single Layer Feedforward Network – Multilayer Feedforward Network – Recurrent Networks - Learning Methods – Taxonomy of Neural Network Architectures –History of Neural Networks Research-Early Neural Networks Architectures – Rosenblatt’s Perception – ADALINE Network – MADELINE Networks.

SELF STUDY :Single Layer Feedforward Network

UNIT II BACK PROPAGATION NETWORKS

(12 Hours)

Architecture of back propagation network – The Perceptron Model – The Solution – Single Layer Artificial Neural Network – Model for Multilayer Perceptron - Back Propagation Learning – Input Layer Computation – Hidden Layer Computation – Output Layer Computation – Calculation of Error – Training of Neural Network – Method of Steepest Descent – Effect of Learning Rate – Adding a Momentum Term – Backpropagation Algorithm - Applications – Design of Journal Bearing – Classification of Soil – Hot Extrusion of Steel - Selection Of Various Parameters in BPN – Number of Hidden Nodes – Momentum Coefficient – Sigmoidal Gain – Local Minima – Learning Coefficient.

SELF STUDY :Single Layer Artificial Neural Network

UNIT III ADAPTIVE REASONANCE THEORY

(12 Hours)

Introduction –Cluster Structure – Vector Quantization – Classical ART Networks – Simplified SRT Architecture - ART 1 – Architecture of ART1 – Special Features of ART1 Models – ART1 Algorithm - ART2 – Architecture – ART2 Algorithm - Applications –Character Recognition Using ART1 – Classification of Soil – Prediction of Load from Yield Line Patterns of Elastic Plastic Clamped Square Plate - Sensitivities of ordering of data.

SELF STUDY :Vector Quantization

UNIT IV

(12 Hours)

FUZZY LOGIC PRINCIPLES, CLASSICAL SETS AND FUZZY SETS

The Case for Imprecision - A Historical Perspective - The Utility of Fuzzy Systems - Limitations of Fuzzy Systems - The Illusion: Ignoring Uncertainty and Accuracy - Uncertainty and Information - The Unknown - Fuzzy Sets and Membership - Chance Versus Fuzziness - Sets as Points in Hypercubes - Classical Sets - Operations on Classical Sets - Properties of Classical (Crisp) Sets - Mapping of Classical Sets to Functions - Fuzzy Sets - Fuzzy Set Operations - Properties of Fuzzy Sets - Alternative Fuzzy Set Operations.

SELF STUDY :Limitations of Fuzzy Systems

UNIT V

(12 Hours)

CLASSICAL RELATIONS AND FUZZY RELATIONS, PROPERTIES OF MEMBERSHIP FUNCTIONS, FUZZIFICATION, AND DEFUZZIFICATION

Cartesian Product - Crisp Relations - Cardinality of Crisp Relations - Operations on Crisp Relations - Properties of Crisp Relations - Composition - Fuzzy Relations - Cardinality of Fuzzy Relations - Operations on Fuzzy Relations - Properties of Fuzzy Relations - Fuzzy Cartesian Product and Composition - Tolerance and Equivalence Relations - Crisp Equivalence Relation - Crisp Tolerance Relation .

Features of the Membership Function - Various Forms - Fuzzification - Defuzzification to Crisp Sets - λ -Cuts for Fuzzy Relations - Defuzzification to Scalars.

SELF STUDY : Cartesian Product.

REFERENCES:

1. Rajasekaran. S., Vijayalakshmi Pai. G.A. "Neural Networks, Fuzzy Logic and Genetic Algorithms", Prentice Hall of India Private Limited, 2011
2. Timothy J. Ross, "Fuzzy logic with Engineering Applications", McGraw Hill, 2011
3. S. Rajasekaran, G. A. Vijayalakshmi Pai "Neural Networks, Fuzzy Systems and Evolutionary Algorithms Synthesis and Applications" 2nd Edition, PHI 2017.
4. Laurance Fausett, "Fundamentals of Neural Networks", Prentice hall, 2006.

WEB REFERENCES:

1. http://en.wikipedia.org/wiki/Neural_network
2. http://en.wikipedia.org/wiki/Fuzzy_logic
3. <https://books.google.co.in/books?isbn=8120321863>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 FUNDAMENTALS OF NEURAL NETWORKS				
1.1	Basic Concepts of Neural Networks , Human Brain	1	Chalk & Talk	Black Board
1.2	Model of An Artificial Neuron , Neural Network Architectures	2	Chalk & Talk	Black Board
1.3	Single Layer Feedforward Network , Multilayer Feedforward Network	1	Lecture	White board
1.4	Recurrent Networks , Learning Methods	1	Chalk & Talk	Black Board
1.5	Taxonomy of Neural Network Architectures	2	Discussion	Black Board
1.6	History of Neural Networks Research	2	Lecture	White board
1.7	Early Neural Networks Architectures , Rosenblatt's Perception	1	Lecture	White board
1.8	ADALINE Network , MADELINE Networks	2	Discussion	Google classroom
UNIT - 2 BACK PROPAGATION NETWORKS				
2.1	Architecture of back propagation network , The Perceptron Model , The Solution	1	Lecture	PPT
2.2	Single Layer Artificial Neural Network , Model for Multilayer Perceptron	2	Chalk & Talk	Black Board
2.3	Back Propagation Learning , Input Layer Computation , Hidden Layer Computation	2	Lecture	PPT
2.4	Output Layer Computation , Calculation of Error , Training of Neural Network	1	Lecture	White board
2.5	Method of Steepest Descent , Effect of Learning Rate	1	Discussion	Black Board
2.6	Adding a Momentum Term , Backpropagation Algorithm , Applications	1	Chalk & Talk	Black Board
2.7	Design of Journal Bearing , Classification of Soil , Hot	2	Chalk & Talk	Black Board

	Extrusion of Steel			
2.8	Selection Of Various Parameters in BPN , Number of Hidden Nodes , Momentum Coefficient	1	Lecture	PPT
2.9	Sigmoidal Gain , Local Minima , Learning Coefficient	1	Lecture	PPT
UNIT – 3ADAPTIVE REASONANCE THEORY				
3.1	Introduction , Cluster Structure	1	Lecture	White board
3.2	Vector Quantization , Classical ART Networks	1	Chalk & Talk	Black Board
3.3	Simplified SRT Architecture , ART 1 , Architecture of ART1	2	Lecture	PPT
3.4	Special Features of ART1 Models , ART1 Algorithm	2	Lecture	White board
3.5	ART2 , Architecture , ART2 Algorithm , Applications	2	Discussion	Black Board
3.6	Character Recognition Using ART1 , Classification of Soil	2	Lecture	PPT
3.7	Prediction of Load from Yield Line Patterns of Elastic Plastic Clamped Square Plate	1	Chalk & Talk	Black Board
3.8	Sensitivities of ordering of data	1	Lecture	White board
UNIT - 4 FUZZY LOGIC PRINCIPLES, CLASSICAL SETS AND FUZZY SETS				
4.1	The Case for Imprecision , A Historical Perspective	2	Lecture	PPT
4.2	The Utility of Fuzzy Systems , Limitations of Fuzzy Systems	2	Lecture	PPT
4.3	The Illusion: Ignoring Uncertainty and Accuracy	1	Chalk & Talk	Black Board
4.4	Uncertainty and Information , The Unknown , Fuzzy Sets and Membership	1	Chalk & Talk	Black Board
4.5	Chance Versus Fuzziness , Sets as Points in Hypercubes	1	Discussion	Black Board
4.6	Classical Sets , Operations on Classical Sets	1	Lecture	PPT
4.7	Properties of Classical (Crisp) Sets , Mapping of Classical Sets to Functions	1	Chalk & Talk	Black Board
4.8	Fuzzy Sets , Fuzzy Set Operations	1	Lecture	PPT

4.9	Properties of Fuzzy Sets , Alternative Fuzzy Set Operations	2	Lecture	PPT
UNIT – 5 CLASSICAL RELATIONS AND FUZZY RELATIONS, PROPERTIES OF MEMBERSHIP FUNCTIONS, FUZZIFICATION, AND DEFUZZIFICATION				
5.1	Cartesian Product , Crisp Relations	1	Chalk & Talk	Black Board
5.2	Cardinality of Crisp Relations , Operations on Crisp Relations	1	Lecture	PPT
5.3	Properties of Crisp Relations , Composition	1	Lecture	PPT
5.4	Fuzzy Relations , Cardinality of Fuzzy Relations	1	Lecture	White board
5.5	Operations on Fuzzy Relations , Properties of Fuzzy Relations	2	Lecture	White board
5.6	Fuzzy Cartesian Product and Composition	1	Lecture	White board
5.7	Tolerance and Equivalence Relations , Crisp Equivalence Relation	1	Lecture	White board
5.8	Crisp Tolerance Relation . Features of the Membership Function	1	Chalk & Talk	Black Board
5.9	Various Forms , Fuzzification	1	Chalk & Talk	Black Board
5.10	Defuzzification to Crisp Sets , λ - Cuts for Fuzzy Relations	1	Discussion	Black Board
5.11	Defuzzification to Scalars	1	Chalk & Talk	Black 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	Explore the functional components of artificial neural networks..	K2, K4	PSO1 & PSO2
CO 2	Examine the principles of back propagation networks.	K2, K3, K4	PSO1 & PSO2
CO 3	Expose the students to the concepts of predicting the functionalities of ART.	K2 , K4	PSO3 & PSO5
CO 4	Analyze the logic principle of classical sets and fuzzy set operations in fuzzy set theory.	K2, K3,K4& K5	PSO3 & PSO4
CO 5	Identify the concept of fuzzification and defuzzification involved in various systems.	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	1	1	2	1	3
CO4	1	1	3	2	1
CO5	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	1	2	1	1	1	3	1	1	1	1	1	1
CO2	1	1	1	1	3	1	1	1	1	1	2	1
CO3	1	1	2	1	1	1	1	1	3	1	1	1
CO4	3	1	1	1	1	1	2	1	1	1	1	1
CO5	1	3	1	2	1	1	1	1	1	1	1	1

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

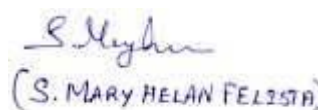
COURSE DESIGNER:

Staff Name – R. SMEETA MARY



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HOD'S Signature & Name



(S. MARY HELAN FELISTA)

I MCA
SEMESTER – I

EMPLOYABILITY-100%

(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

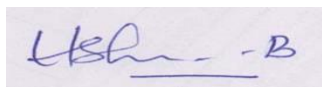
Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

COURSE DESIGNER

B.USHA



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

EMPLOYABILITY-100%**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

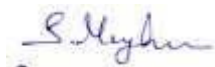
Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

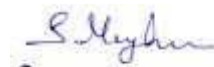
COURSE DESIGNER

S. Mary Helan Felista


(S. MARY HELAN FELISTA)

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)

I MCA**SEMESTER –I***(For those who joined in 2020 onwards)*

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCA107	SKILL BASED-LAB I- LINUX	SKILL BASED	2	1

COURSE DESCRIPTION

This course provides focus on the fundamental tools and concepts of Linux and Unix OS. It gives practical exposure on topics such as LINUX environment, commands, file system, processes and utilities. Specific emphasis is given to the bash shell and user environment with several flavours of UNIX/Linux using a version of Red Hat Linux.

COURSE OBJECTIVES

- ❖ To learn the basic set of commands and utilities in Linux.
- ❖ To develop software for Linux systems.

LAB LIST**Shell programming**

1. Using Basic Commands.
2. Arithmetic Operations Using Case Statement.
3. Sum of the Digits Calculation.
4. Check for file Existence.
5. Check for String Palindrome.

6. Prime Number Generation.
7. Factorial Calculation.
8. Pattern checking Using grep command.
9. Open a file using System Call.

C programming

1. Open a file using System Call.
2. Emulate scanf and printf Function.
3. Copying Files.
4. Changing File Permissions.
5. File Copy using fgetc.
6. Print the directory Content.
7. Memory Allocation.
8. File Manipulations.
9. Simple C Programs.

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 Linux utilities and develop shell scripts to perform tasks.	K2	PSO1
CO 2	Effectively use Linux environment to accomplish software development tasks	K2, K3, K4	PSO1 & PSO2
CO 3	Monitor system performance and network activities	K2 & K3	PSO3

Mapping COs Consistency with PSOs

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

Mapping of COs 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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

COURSE DESIGNER:

Staff Name – P.NANCY VINCENTINA MARY

P. Nancy

Forwarded By

HOD'S Signature & Name

S. Mary
(S. MARY MELAN FELISTA)

I MCA
SEMESTER – I
(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCA108	SOFT SKILLS I – PROFESSIONAL COMMUNICATION	SOFTSKILLS	2	1

COURSE DESCRIPTION

This course provides skills of oral and written communication to work in different environments, develop emotional sensitivity and an awareness of how to work and negotiate with people.

COURSE OBJECTIVE:

- ❖ To communicate ethically and efficiently.

TOPICS

1. Elements of Communication
 - a. The importance of communication through English
 - b. Factors that influence communication
 - c. Verbal and Non Verbal Communication
 - d. Business Communication
2. Review of English Grammar.
3. Pronunciation Practice.
4. The Sounds of English.
5. Reading and Writing Skills.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
SECTION 1 – ELEMENTS OF COMMUNICATION				
1.1	The importance of communication through English	3	Lecture	White board
1.2	Factors that influence communication	3	Chalk & Talk	Black Board
1.3	Verbal and Non Verbal Communication	5	Discussion	Black Board
1.4	Business Communication	3	Lecture	White board
SECTION 2 - ENGLISH GRAMMAR				
2.1	Review of English Grammar	5	Lecture	White board
2.2	Pronunciation Practice	3	Chalk & Talk	Black Board
2.3	The Sounds of English	3	Discussion	Black Board
2.4	Reading and Writing Skills	5	Lecture	White board

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	Display competence in oral and written communication.	K2	PSO1 & PSO2
CO 2	Use current technology related to the communication.	K2, K3	PSO2 & PSO3
CO 3	Ability to enhance reading and writing skills	K3	PSO3

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	1	1	3	1	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	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	2	3	3	1	1	2	1	2

COURSE DESIGNER:

Staff Name – R. SMEETA MARY



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

I MCA**SEMESTER – II****(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCA201	DATA STRUCTURES AND ALGORITHMS	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides knowledge on several fundamental algorithms and data structures and to implement them in C++ to be an effective designer, developer, or customer for new applications.

COURSE OBJECTIVE

- ❖ To understand the concept of data structures through ADT including List, Stack and Queues.
- ❖ To design, develop and implement various data structure algorithms.
- ❖ To compute the complexity of various algorithms.

UNIT – I LISTS, STACKS AND QUEUES**(12 Hours)**

Abstract Data Types - The List ADT – Array Implementation of List - Single Linked Lists – Doubly Linked Lists – Circular Linked Lists - The Stack ADT - Stack Model – Implementation Of Stacks - The Queue ADT -Queue Model – Implementation Of Queues.

SELF STUDY :Applications of Stack and queue

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

Preliminaries - Implementation Of Trees – Tree Traversals With An Application – Binary Trees – Implementation – The Search Tree ADT – Binary Search Trees – Make Empty – Find – Min and Max – Insert – Delete.

SELF STUDY :Expression Trees

UNIT - III ADVANCED SEARCH TREES AND HASHING

(12 Hours)

AVL Trees – Splay Trees – Tree Traversals - B-Trees – Hashing - General Idea – Hash Function – Open Addressing – Linear Probing – Quadratic Probing – Double Hashing – Rehashing – Extendible Hashing.

SELF STUDY : Separate Chaining

UNIT - IV PRIORITY QUEUE AND SORTING

(12 Hours)

Priority Queue (Heaps) - Model – Implementation - Binary Heap- Structure Property-Heap Order Property - Basic Heap Operations – Selection Problem - Sorting - Insertion Sort – Heap Sort – Merge Sort – Quick Sort - Bucket Sorting– External Sorting.

SELF STUDY : Application of Priority Queues

UNIT - V GRAPHS

(12 Hours)

Graph Algorithm - Definitions – Representation of Graphs – Shortest-Path Algorithms. Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm – Kruskal's Algorithm - Greedy Algorithms – Huffman Codes - Divide And Conquer – Running Time Of Divide And Conquer Algorithms-Closest Point Problem.

SELF STUDY : A Simple Scheduling Problem

REFERENCES :

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education Asia, 2016.
2. Seymour Lipschutz, "Data structures with C", Tata Mc Graw Hill, 2011.
3. Debasis Samanta, "Classic Data Structures", 2nd Edition, PHI, 2012.
4. Ashok N. Kamthane , "Programming and Data structure", Dorling Kindersley, 2012.
5. E. Balagurusamy, "Data Structures using C", Tata McGraw Hill, 2015 Reprint.

WEB REFERENCES:

1. <https://www.w3schools.in/data-structures-tutorial/intro>
2. <https://www.tutorialride.com/data-structures/data-structures-tutorial.htm>
3. <https://www.geeksforgeeks.org/fundamentals-of-algorithms/>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 LISTS, STACKS AND QUEUES				
1.1	Abstract Data Types, List ADT	1	Chalk & Talk	Black Board
1.2	Array Implementation of List	2	Chalk & Talk	Black Board
1.3	The Stack ADT	1	Lecture	White board
1.4	Stack Model	1	Chalk & Talk	Black Board
1.5	Implementation of Stacks	2	Discussion	Black Board
1.6	Applications of Stack	2	Lecture	White board
1.7	Queue Model	1	Lecture	White board
1.8	Implementation, Applications of Queues	2	Discussion	Google classroom
UNIT - 2 TREES				
2.1	Introduction To Trees, Binary Trees	1	Lecture	PPT
2.2	Implementation Of Trees	2	Chalk & Talk	Black Board
2.3	Tree Traversals With An Application	2	Lecture	PPT
2.4	Binary Tree Implementation	2	Lecture	White board
2.5	Expression Trees	1	Discussion	Black Board
2.6	The Search Tree ADT	1	Chalk & Talk	Black Board
2.7	Binary Search Trees	1	Chalk & Talk	Black Board
2.8	Binary Search Tree Operations	2	Lecture	PPT
UNIT – 3ADVANCED SEARCH TREES AND HASHING				
3.1	AVL Trees	1	Lecture	White board
3.2	Splay Trees	1	Chalk & Talk	Black Board
3.3	Tree Traversals	1	Lecture	PPT

3.4	B-Trees	1	Lecture	White board
3.5	Hashing, Hash Function	1	Discussion	Black Board
3.6	Separate Chaining	1	Lecture	PPT
3.7	Open Addressing	1	Chalk & Talk	Black Board
3.8	Linear Probing	1	Lecture	White board
3.9	Quadratic Probing	1	Chalk & Talk	Black Board
3.10	Double Hashing	1	Chalk & Talk	Black Board
3.11	Rehashing	1	Discussion	Black Board
3.12	Extendible Hashing	1	Lecture	White board
UNIT - 4 PRIORITY QUEUE AND SORTING				
4.1	Priority Queue Model	1	Lecture	PPT
4.2	Priority Queue Implementation	2	Lecture	PPT
4.3	Binary Heap	1	Chalk & Talk	Black Board
4.4	Basic Heap Operations	1	Chalk & Talk	Black Board
4.5	Application Of Priority Queues	1	Discussion	Black Board
4.6	Selection Problem	1	Lecture	PPT
4.7	Insertion Sort, Heap Sort	1	Chalk & Talk	Black Board
4.8	Merge Sort	1	Lecture	PPT
4.9	Quick Sort	1	Lecture	PPT
4.10	Bucket Sorting	1	Chalk & Talk	Black Board
4.11	External Sorting	1	Chalk & Talk	Black Board
UNIT - 5 GRAPHS				
5.1	Definition of Graph Algorithm	1	Chalk & Talk	Black Board
5.2	Representation of Graphs	1	Lecture	PPT
5.3	Shortest-Path Algorithms, Minimum Spanning Tree	1	Lecture	PPT

5.4	Dijkstra's Algorithm	1	Lecture	White board
5.5	Prim's Algorithm	1	Lecture	White board
5.6	Kruskal's Algorithm	1	Lecture	White board
5.7	Greedy Algorithms	1	Lecture	White board
5.8	A Simple Scheduling Problem	1	Chalk & Talk	Black Board
5.9	Huffman Codes	1	Chalk & Talk	Black Board
5.10	Divide And Conquer	1	Discussion	Black Board
5.11	Running Time Of Divide And Conquer Algorithms	1	Chalk & Talk	Black Board
5.12	Closest Point Problem	1	Discussion	Black 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	Select appropriate data structures as applied to specified problem definition.	K2, K4	PSO1 & PSO 2
CO 2	Implement operations like searching, insertion, deletion and traversing in trees.	K2, K3, K4	PSO2 & PSO4
CO 3	Compare the data structures of advanced search trees.	K2 , K4	PSO1 & PSO3
CO 4	Implement appropriate heap operations, sorting, searching techniques for a given problem.	K2, K3,K4& K5	PSO2 & PSO4
CO 5	Determine and analyze the complexity of graph Algorithms.	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 COs 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:

Staff Name – S. JEBAPRIYA



Forwarded By

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	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

WEB REFERENCES:

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:

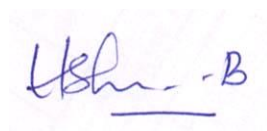
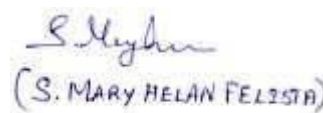
NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the functionalities of Networking layers of both OSI and TCP/IP reference models.	K2, K4	PSO1 & PSO2
CO 2	Analyze the design issues of Datalink layer and techniques to resolve it.	K2, K3, K4	PSO2 & 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 5	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: ϕ Strongly Correlated – 3 ϕ Moderately Correlated – 2 ϕ 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)

EMPLOYABILITY-100%

I MCA

SEMESTER – II

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WE K	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, PACKAGES AND 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

Level s	C1	C2	C3	C4	Total Scholasti c Marks	Non Scholasti c Marks C5	CIA Tota l	% of Assessmen t
	10 Mk s	15 Mk s	5+5=1 0 Mks .	10 Mk s	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 COs 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:

B.USHA



Forwarded By

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	20MCADA03	BIG DATA ANALYTICS	SPECIALIZATION ELECTIVE – DATA ANALYTICS	4	4

COURSE DESCRIPTION

This course provides familiarization to the important information technologies used in manipulating, storing and analyzing big data.

COURSE OBJECTIVE

- ❖ To explore the fundamental concepts of Big Data analytics
- ❖ To understand the various technology foundations for Big Data
- ❖ To learn the Hadoop and Map Reduce Concepts

UNIT – I**(12 Hours)****GRASPING THE FUNDAMENTALS OF BIG DATA**

Evolution of Data Management –Understanding the waves of managing data –
Defining Big Data – Building a Successful Big Data management architecture

EXAMINING BIG DATA TYPES

Defining Structured data- Defining Unstructured data- Real time and non- real –
time requirements – Managing Different data types – Integrating Data types

SELF STUDY: Managing Different data types

UNIT - II

(12 Hours)

BIG DATA TECHNOLOGY COMPONENTS

Exploring the Big Data stacks – Redundant physical Infrastructure – Security Infrastructure –Operational Databases – Organizing data services and tools – Analytical data warehouses –Big data analytics- Big data applications

DEFINING BIG DATA ANALYTICS

Using Big Data to Get Results – Modifying Business intelligence Products to Handle Big Data – Studying Big Data Analytics Examples – Big data Analytics Solutions

SELF STUDY: Organizing data services and tools

UNIT- III

(12 Hours)

GETTING STARTED WITH HADOOP

Introduction - Need for Hadoop – Origin and Design of Hadoop – Examining the various offerings of Hadoop

USE CASES FOR BIG DATA IN HADOOP

Adopting Hadoop – Log Data Analysis – Data Warehouse Modernization – Fraud Detection – Risk Modeling – Social Sentiment Analysis – Image Classification

SELF STUDY: Fraud Detection

UNIT - IV

(12 Hours)

STORING DATA IN HADOOP : THE HDFS

Storing data in Hadoop - Data Storage in HDFS – HDFS federation – HDFS High Availability

READING AND WRITING DATA

Compressing Data – Managing files – Ingesting Log Data

SELF STUDY: Compressing Data

UNIT - V

(12 Hours)

MAPREDUCE PROGRAMMING

Importance – Doing things in parallel – Writing Map Reduce Applications

FRAMEWORKS FOR PROCESSING DATA IN HADOOP

Running Applications before Hadoop – Seeing a World beyond MapReduce – Real-Time And Streaming Applications

SELF STUDY: Seeing a World beyond MapReduce

REFERENCES:

1. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, “ Big Data”, Wiley India Pvt ltd, 2015
2. Dirk deRoos , “Hadoop for Dummies”, John Wiley and sons , 2014
3. Jisha Mariam Jose, “ Hadoop Practice Guide: SQOOP, PIG, HIVE, HBASE for Beginners”, Notion Press, 2019
4. Chanchal Singh, “Mastering Hadoop 3”, Packt Publishing; 1st edition, 2019

WEB REFERENCES:

1. http://www.planetdata.eu/sites/default/files/presentations/Big_Data_Tutorial_part4.pdf
2. <https://www.guru99.com/introduction-to-mapreduce.html>
3. <https://www.dezyre.com/hadoop-tutorial/hadoop-mapreduce-tutorial>

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 GRASPING THE FUNDAMENTALS OF BIG DATA				
1.1	Evolution of Data Management – Understanding the waves of managing data – Defining Big Data	3	Lecture	Black Board
1.2	Building a Successful Big Data management architecture	2	Lecture	White board
1.3	Defining Structured data- Defining Unstructured data-	2	Lecture	PPT
1.4	Real time and non- real – time requirements	2	Lecture	PPT
1.5	Managing Different data types – Integrating Data types	3	Lecture	PPT
UNIT-2 BIG DATA TECHNOLOGY COMPONENTS				
2.1	Exploring the Big Data stacks – Redundant physical Infrastructure – Security Infrastructure	2	Lecture	White board
2.2	Operational Databases – Organizing data services and tools	2	Discussion	Black Board
2.3	– Analytical data warehouses –Big data analytics- Big data applications	2	Chalk & Talk	Black Board
2.4	Defining Big Data Analytics	2	Chalk & Talk	Black Board
2.5	Using Big Data to Get Results – Modifying Business intelligence Products to Handle Big Data	2	Discussion	Black Board
2.6	Studying Big Data Analytics Examples – Big data Analytics Solutions	2	Discussion	Black Board
UNIT-3 GETTING STARTED WITH HADOOP				
3.1	Introduction - Need for Hadoop	2	Lecture	White board

3.2	Origin and Design of Hadoop– Examining the various offerings of Hadoop	2	Chalk & Talk	Black Board
3.3	Adopting Hadoop – Log Data Analysis	2	Lecture	PPT
3.4	Data Warehouse Modernization - Fraud Detection	2	Lecture	White board
3.5	Risk Modeling	2	Discussion	Black Board
3.6	Social Sentiment Analysis – Image Classification	2	Lecture	PPT
UNIT 4 - STORING DATA IN HADOOP				
4.1	Storing data in Hadoop	3	Lecture	PPT
4.2	Data Storage in HDFS – HDFS federation	2	Lecture	PPT
4.3	HDFS High Availability	2	Lecture	Black Board
4.4	Managing files	2	Lecture	PPT
4.5	Ingesting Log Data	3	Lecture	White board
UNIT -5 MAPREDUCE PROGRAMMING				
5.1	Importance	2	Lecture	PPT
5.2	Doing things in parallel	2	Lecture	PPT
5.3	Writing Map Reduce Applications	2	Lecture	PPT
5.4	Running Applications before Hadoop	2	Lecture	White board
5.5	Seeing a World beyond MapReduce	2	Lecture	PPT
5.6	Real-Time And Streaming Applications	2	Lecture	White board

Level s	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assess ment
	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	Understand the fundamentals of various big data analysis techniques	K2, K4	PSO1 & PSO2
CO 2	Analyze the big data analytic techniques for useful business applications.	K2, K3, K4	PSO2 & PSO4
CO 3	Examine the HADOOP and Map Reduce technologies associated with big data analytics	K2 , K4	PSO3 & PSO4
CO 4	Scrutinize the various storage architecture using HDFS and Map reducing techniques	K2, K3,K4 & K5	PSO3 & PSO5
CO 5	Understand and Explore Map Reduce Programming	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	1	2	1	3	1
CO3	1	1	2	2	1
CO4	1	1	3	1	2
CO5	1	1	1	2	3

Note: ϕ Strongly Correlated – 3

ϕ Moderately Correlated – 2

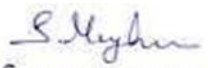
ϕ Weakly Correlated -1

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	1	2	1	2	2	2	2	1	1	2
CO3	2	2	2	1	2	3	2	2	1	2	1	2
CO4	2	3	3	1	2	3	2	3	2	2	2	2
CO5	3	3	3	2	3	3	3	3	2	3	3	3

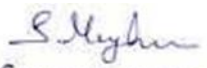
COURSE DESIGNER

S. Mary Helan Felista


(S. MARY HELAN FELISTA)

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)

SKILL DEVELOPMENT-100%

II MCA

SEMESTER – II

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCADA04	DATA ANALYTICS TOOLS & TECHNIQUES	SPECIALIZATION ELECTIVE – DATA ANALYTICS	4	4

COURSE DESCRIPTION

This course provides knowledge on creating applications to analyze big data.

COURSE OBJECTIVE

- ❖ Learn about the fundamental concepts of Pig and Hive.
- ❖ Provide knowledge on writing scripts through Pig Latin and understanding Hive data model.
- ❖ Perform data definition and data manipulation operations using HiveQL and apply these to perform analytics

UNIT – I DATA ANALYTICS USING PIG

(12 Hours)

Introduction – Downloading and installing pig – Running Pig - Grunt – Pig's Data model – Types – Schemas.

SELF STUDY:Types

UNIT – II INTRODUCTION TO PIG LATIN

(12 Hours)

Preliminary matters - Input and Output – Relational operations – User defined functions-Advanced relational Operations -Integrating Pig with legacy code and map reduce – Controlling execution.

SELF STUDY: Relational operations

UNIT - III DEVELOPING AND TESTING PIG LATIN SCRIPTS (12 Hours)

Writing Evaluation and filter functions – Writing load and store functions –

HIVE - INTRODUCTION

Developing Hive – Services in Hive – Understanding Hive Data model.

UNIT – IV HIVEQL: DATA DEFINITION

(12 Hours)

Databases – Alter database – Create Tables – Alter Tables – Manage Tables – Drop Tables.

HIVEQL: DATA MANIPULATION

Load Data into managed tables – Insert into tables from Queries - Creating Tables and Loading Them in One Query - Exporting Data.

SELF STUDY: Insert into tables from Queries

UNIT – V HIVEQL QUERIES

(12 Hours)

SELECT ... FROM Clauses – Where Clauses – Group by clauses - Join Statements – ORDER BY and SORT BY- DISTRIBUTE BY with SORT BY- CLUSTER BY – casting - Queries that Sample Data – UNION ALL

HIVEQL VIEWS

HiveQL: Indexes - Schema Design – Tuning – Functions – Streaming - Customizing Hive File and Record formats – Security – Locking

SELF STUDY: ORDER BY and SORT BY

REFERENCES:

1. Alan Gates ,“Programming Pig”, First edition, O’Reilly Media, 2011
2. Hanish Bansal, Saurabh Chauhan ,“Apache Hive Cookbook”, Packt publishing, 2016
3. 3.Jason Rutherglen, Dean Wampler, Edward Capriolo ,“Programming Hive”, First edition, O’Reilly Media , 2012
4. “Alan Gates & Daniel Dai ,Pig :Data flow Scripting with Hadoop”, O’Reilly Media, 2016
5. BalaswamyVaddeman ,“Beginning Apache Pig” , Apress Publications, 2016
6. Dayong Du, “Apache Hive Essentials”, Packet Publishing, 2015

WEB REFERENCES:

1. <https://cognitiveclass.ai/courses/introduction-to-pig/>
2. <https://data-flair.training/blogs/apache-hive-tutorial/>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT 1 DATA ANALYTICS USING PIG				
1.1	Data Analytics using Pig: Introduction	2	Lecture	Black Board
1.2	Downloading and installing pig	2	Chalk & Talk	White board
1.3	Running Pig	2	Lecture	PPT
1.4	Grunt	2	Discussion	PPT
1.5	Pig's Data model	2	Lecture	PPT
1.6	Schemas	2	Chalk & Talk	White board
UNIT 2 INTRODUCTION TO PIG LATIN				
2.1	Introduction to Pig Latin – Preliminary matters	2	Lecture	PPT
2.2	Input and Output	2	Chalk & Talk	Black Board
2.3	User defined function	2	Lecture	PPT
2.4	Advanced relational Operations	2	Lecture	White board
2.5	Integrating Pig with legacy code and map reduce	2	Discussion	Black Board
2.6	Controlling execution	2	Chalk & Talk	Black Board
UNIT 3 DEVELOPING AND TESTING PIG LATIN SCRIPTS& HIVE - INTRODUCTION				
3.1	Developing and Testing Pig Latin Scripts	2	Lecture	White board
3.2	Writing Evaluation and filter functions	2	Chalk & Talk	Black Board
3.3	Writing load and store functions	2	Lecture	PPT
3.4	Developing Hive	2	Lecture	White board

3.5	Services in Hive	2	Discussion	Black Board
3.6	Understanding Hive Data model	2	Lecture	PPT
UNIT 4 HIVEQL: DATA DEFINITION&HIVEQL: DATA MANIPULATION				
4.1	HiveQL: Data definition – Databases	2	Lecture	PPT
4.2	Alter database – Create Tables	2	Lecture	PPT
4.3	Alter, Manage & Drop Tables.	2	Discussion	Black Board
4.4	HiveQL: Data manipulation	2	Lecture	PPT
4.5	Load Data into managed tables	2	Chalk & Talk	White board
4.6	Creating Tables and Loading Them in One Query-Exporting Data	2	Lecture	White board
UNIT 5 HIVEQL QUERIES&HIVEQL VIEWS				
5.1	HiveQL: Queries – SELECT ... FROM Clauses- Where Clauses – Group by clauses	2	Lecture	PPT
5.2	Join Statements	1	Chalk & Talk	PPT
5.3	DISTRIBUTE BY with SORT BY	2	Lecture	PPT
5.4	CLUSTER BY – casting	1	Discussion	White board
5.5	Queries that Sample Data – UNION ALL	2	Lecture	Black Board
5.6	HiveQL: Views - HiveQL: Indexes - Schema Design	2	Chalk & Talk	Black Board
5.7	Tuning – Functions – Streaming - Customizing Hive File and Record formats – Security – Locking	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	W1+ W2 5+5=10	Avg (M1 & M2) 10	Mid-Sem.Test 15	Once in a Sem. 10		5	50	
K1	-	-	-	-	-		-	-
K2	5	2	3	-	10		10	20 %
K3	5	3	4		12		12	24 %
K4	-	5	4	5	14		14	28%
K5	-	-	4	5	9		9	18 %
Non-Scho.							5	10 %
Total	10	10	15	10	45	5	50 mks.	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	10	15	10	5	50	50	100

C1 – Sum of Two Weekly Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Once in a semester (Seminar / Assignment)

C5 – Non – Scholastic

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 programming constructs of Pig and database management using HiveQL	K2	PSO1 & PSO2
CO 2	Write scripts using Pig latin and perform various HiveQLqueries by applying RDBMS concepts	K2, K3, K4	PSO1 & PSO2
CO 3	Apply the concepts of Pig and Hive in simple tasks	K2 & K3	PSO1 & PSO3
CO 4	Formulate and analyse different databases for different situations	K2, K3 & K5	PSO1 & PSO4
CO 5	Create real time applications	K2,K3 & K5	PSO1 & PSO5

Mapping COs Consistency with PSOs

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

Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

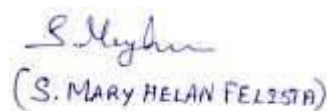
COURSE DESIGNER:

Staff Name – B. USHA



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

EMPLOYABILITY-100%

II MCA

SEMESTER –II

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCADS03	CRYPTOGRAPHY & NETWORK SECURITY	SPECIALIZATION ELECTIVE – DISTRIBUTED SYSTEM SECURITY	4	4

COURSE DESCRIPTION

This course provides basic understanding of previous attacks on cryptosystems with the aim of preventing future attacks and to provide security using various cryptographic tools.

COURSE OBJECTIVE

- ❖ Understand the OSI security architecture and classical encryption techniques.
- ❖ To be able to secure a message over insecure channel by various means.
- ❖ Acquire knowledge on various algorithms, block and stream cipher models.
- ❖ Portray the principles of public key cryptosystems.

UNIT –IOVERVIEW AND CLASSICAL ENCRYPTION TECHNIQUES (12 Hours)

Computer Security Concepts – OSI Security Architecture – Security attacks – Security Services – Security mechanisms –Model for Network Security - Symmetric Cipher Model - Cryptography – Cryptanalysis and Brute Force Attack – Substitution techniques – Caesar Cipher – Monoalphabetic Ciphers – Playfair cipher – Polyalphabetic Cipher – Vigenere Cipher – Vernam Cipher.

SELF STUDY :Steganography, Transposition techniques

UNIT - II BLOCK CIPHERS, DES AND AES `

(12 Hours)

Traditional Block Cipher Structure – Stream Ciphers and Block Ciphers – Feistel Cipher Structure – Feistel Decryption Algorithm - Data Encryption Standard – DES Encryption – DES Decryption – Block Cipher Design Principles – AES Structure – AES Transformation Functions – Electronic Codebook – Cipher Block Chaining Mode – Cipher Feedback Mode – Output Feedback Mode.

UNIT- III PUBLIC-KEY CRYPTOGRAPHY & DIGITAL SIGNATURES(12 Hours)

Principles of Public Key Cryptosystems – Applications - Cryptanalysis - RSA Algorithm – Description – Computational Aspects – Security of RSA - Diffie - Hellman key Exchange – Algorithm – Key Exchange Protocols – Man in the middle attack – Message Authentication Requirements – Functions – Message encryption - Digital Signatures – Properties – Attacks and forgeries – Requirements – Direct Digital Signature.

SELF STUDY :Requirements of Public key cryptosystem

UNIT - IV ELECTRONIC MAIL AND IP SECURITY

(12 Hours)

Internet Mail Architecture – Protocols - Pretty Good Privacy – Notation – Operational Description – Domain Keys identified Mail Architecture – Characteristics – DKIM strategy – DKIM Functional flow - IP Security Overview – Applications – Benefits – Routing Applications – Authentication plus Confidentiality – Key Determination Protocol – Header and Payload Formats.

SELF STUDY :Email Components

UNIT V CrypTool 2

(12 Hours)

Introduction – components – Startcenter – Wizard – Workspace Manager – Online Help – Templates - CrypCloud.

REFERENCES :

1. William Stallings, "Cryptography and Network Security Principles & Practice", 7th Edition, Pearson Education Limited, 2018.
2. Atul Kahate, "Cryptography and Network Security", 3rd Edition, Tata McGraw Hill, 2013.
3. William Stallings, "Network security essentials", Pearson publication.
4. Johannes A. Buchaman, "Introduction to cryptography", Verlag, 2013.

WEB REFERENCES:

1. www.cse-eb.iitkgp.ernet.in/~debdeep/courses_iitkgp/Crypto/index.htm
2. <https://www.tutorialspoint.com/cryptography/>
3. <https://www.future-forces-forum.com/download/Workshop-IntroductionToCrypTool.pdf>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 OVERVIEW AND CLASSICAL ENCRYPTION TECHNIQUES				
1.1	Introduction to Computer Security Concepts	1	Chalk & Talk	Black Board
1.2	OSI Security Architecture	1	Chalk & Talk	Black Board
1.3	Security attacks	1	Lecture	PPT
1.4	Security Services & mechanisms	2	Chalk & Talk	Black Board
1.5	Model for Network Security	1	Discussion	Black Board
1.6	Symmetric Cipher Model	1	Lecture	White board
1.7	Substitution techniques	1	Lecture	PPT
1.8	Playfair, Polyalphabetic Cipher	2	Lecture	White board
1.9	Vigenere, Vernam Cipher	1	Chalk & Talk	Black Board
1.10	Steganography	1	Discussion	Google classroom
UNIT - 2 BLOCK CIPHERS, DES AND AES				
2.1	Traditional Block Cipher Structure	2	Lecture	PPT
2.2	Traditional Block Cipher Structure	2	Chalk & Talk	Black Board
2.3	Traditional Block Cipher Structure	1	Lecture	PPT
2.4	Data Encryption Standard	2	Lecture	White board
2.5	Block Cipher Design Principles	1	Discussion	Black Board

2.6	AES Structure	1	Chalk & Talk	Black Board
2.7	Electronic Codebook	1	Chalk & Talk	Black Board
2.8	Cipher Block Chaining Mode	1	Lecture	White board
2.9	Cipher, Output Feedback Mode	1	Discussion	Black Board
UNIT – 3 PUBLIC-KEY CRYPTOGRAPHY AND DIGITAL SIGNATURES				
3.1	Principles of Public Key Cryptosystems	1	Lecture	White board
3.2	Requirements of Public key cryptosystem	1	Chalk & Talk	Black Board
3.3	RSA Algorithm	2	Lecture	PPT
3.4	Diffie - Hellman key Exchange	2	Lecture	White board
3.5	Man in the middle attack	1	Lecture	PPT
3.6	Message Authentication Requirements	1	Discussion	Google classroom
3.7	Digital Signatures	2	Chalk & Talk	Black Board
3.8	Direct Digital Signature	2	Lecture	PPT
UNIT - 4 ELECTRONIC MAIL AND IP SECURITY				
4.1	Internet Mail Architecture	1	Lecture	PPT
4.2	Pretty Good Privacy	2	Lecture	PPT
4.3	Domain Keys identified Mail Architecture	1	Chalk & Talk	Black Board
4.4	DKIM Functional flow	1	Chalk & Talk	Black Board
4.5	IP Security Overview	1	Discussion	Black Board

4.6	Routing Applications	2	Lecture	PPT
4.7	Authentication plus Confidentiality	1	Chalk & Talk	Black Board
4.8	Key Determination Protocol	2	Discussion	Google classroom
4.9	Header and Payload Formats	1	Discussion	Google classroom
UNIT – 5 CrypTool 2				
5.1	Introduction To CrypTool	2	Chalk & Talk	Black Board
5.2	Components	1	Lecture	PPT
5.3	Startcenter	2	Lecture	PPT
5.4	Wizard	2	Lecture	White board
5.5	Workspace Manager	2	Lecture	White board
5.6	Online Help	1	Lecture	White board
5.7	Templates	1	Lecture	White board
5.8	CrypCloud	1	Discussion	Google classroom

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	W1+ W2 5+5=10	Avg (M1 & M2) 10	Mid-Sem.Test 15	Once in a Sem. 10		5	50	
K1	-	-	-	-	-		-	-
K2	5	2	3	-	10		10	20 %
K3	5	3	4		12		12	24 %
K4	-	5	4	5	14		14	28%
K5	-	-	4	5	9		9	18 %
Non-Scho.							5	10 %
Total	10	10	15	10	45	5	50 mks.	100 %

CIA	
Scholastic	45
Non Scholastic	5
	50

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

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
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C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Once in a semester (Seminar / Assignment)

C5 – Non – Scholastic

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	Evaluate the fundamentals of networks security, security architecture, threats and vulnerabilities	K2	PSO1
CO 2	Compare Stream ciphers and block ciphers.	K2, K3, K4	PSO2
CO 3	Apply the different cryptographic operations of public key cryptography.	K2 & K3	PSO3
CO 4	Pertain the various Authentication schemes to simulate different applications.	K2, K3 & K5	PSO2 & PSO4
CO 5	Applying CrypTool 2 to encrypt and decrypt texts using different ciphers.	K2,K3 & K5	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	1	2	1	3	1
CO5	1	1	1	2	3

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Mapping of COs with POs

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CO1	3	2	2	1	1	2	2	1	1	2	2	1
CO2	3	2	2	1	1	3	3	1	1	1	3	1
CO3	1	3	2	1	3	2	2	2	1	2	1	1
CO4	2	3	1	2	3	1	1	2	2	1	1	1
CO5	1	2	1	1	2	3	3	1	2	2	3	2

COURSE DESIGNER:

Staff Name – S. JEBAPRIYA



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

SKILL DEVELOPMENT-100%

II MCA

SEMESTER – II

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCADS04	CYBER FORENSICS	SPECIALIZATION ELECTIVE – DISTRIBUTED SYSTEM SECURITY	4	4

COURSE DESCRIPTION

This course provides the investigation of computer-related crimes with the goal of obtaining evidence to be presented in a court of law.

COURSE OBJECTIVE

- ❖ Understand the definition of computer forensics fundamentals.
- ❖ Describe the types of computer forensics technology.
- ❖ Analyze various computer forensics systems.
- ❖ Learn to duplicate and preserve digital evidence.

UNIT – I COMPUTER FORENSICS FUNDAMENTALS

(12 Hours)

Introduction - Use in Law Enforcement - Assistance to Human Resources - Services - Benefits of Forensics Methodology - Steps Taken by Specialists – Users of Computer Forensic Evidence - Types of Computer Forensics Technology - Military Forensic Technology - Types of Law Enforcement - Types of Business Technology - Specialized Forensics Techniques - Hidden Data - Spyware and Adware - Encryption Methods and Vulnerabilities - Protecting Data - Internet Tracing Methods - Security and Wireless Technologies - Avoiding Pitfalls with Firewalls.

SELF STUDY :Biometric Security Systems

UNIT II COMPUTER FORENSICS EVIDENCE AND CAPTURE (12 Hours)

Data Recovery -Definition - Data Backup and Recovery – Data Recovery Solution - Hiding and Recovering Hidden Data - Evidence Collection and Data Seizure – Obstacles - Types - Rules - Volatile Evidence - Methods of Collection - Artifacts - Collection Steps - The Chain of Custody - Reconstructing the Attack – Preservation of Digital Evidence and Digital Crime Scene - Computer Evidence Processing Steps – Legal Aspects - Computer Image - Verification and Authentication- Special Needs of Evidential Authentication.

SELF STUDY :Controlling Contamination, The Chain of Custody

UNIT III COMPUTER FORENSICS ANALYSIS (12 Hours)

Discovery of Electronic Evidence - Electronic Document Discovery: A Powerful New Litigation Tool - Identification of Data - Timekeeping - Forensic Identification and Analysis of Technical Surveillance Devices - Reconstructing Past Events - How to Become a Digital Detective - Useable File Formats - Unusable File Formats - Converting Files - Networks - Network Forensics Scenario - A Technical Approach - Destruction of Email – Damaging Computer Evidence - Tools Needed for Intrusion Response to the Destruction of Data.

SELF STUDY :System Testing

UNIT IV THE IW ARSENAL AND TACTICS OF THE MILITARY (12 Hours)

Overview of Military Tactics - Offensive Ruinous IW Tools and Tactics – Offensive Containment IW Tools and Tactics - Defensive Preventive IW Tools and Tactics – Defensive Ruinous IW Tools and Tactics - Defensive Responsive Containment IW Tools and Tactics - Countering Sustained Terrorist IW Tactics - Dealing with Random Terrorist IW - The Future of Information Warfare Arsenal – Weapons of the Future - The Global Positioning System - Snoop, Sniff, and Snuff Tools – EmailWiretaps Like Carnivore Can Steal Sensitive Correspondence - IW Weapons of the Future.

SELF STUDY :Nanotechnology

UNITV SURVEILLANCE TOOLS FOR IW OF THE FUTURE (12 Hours)

Monitoring Everything - The Cyber Footprint and Criminal Tracking - The Implications of Cookies and Integrated Platforms - Wintel Inside, or How Your Computer Is Watching You - Data Mining - The Internet Is Big Brother - The Wireless Internet: Friend or Foe - Advanced Computer Forensics - Advanced Encryption: The Need to Conceal - Advanced Hacking - Advanced Tracker Hackers - The Problems of the Present.

SELF STUDY :Cyber Surveillance

REFERENCES:

1. John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation", Second Edition , 2005.
2. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics ", Tata McGraw -Hill, New Delhi, 2014.
3. Nelson Phillips and EnfingerSteuart, "Computer Forensics and Investigations",Cengage Learning, New Delhi, 2016.
4. Bill Nelson, Amelia Phillips, Chris Steuart,"Guide to Computer Forensics and Investigations processing Digital Evidence", Fifth Edition, Tata McGraw - Hill, New Delhi, 2016.

WEB REFERENCES:

4. <https://homelandforensics.com/forensics.htm>
5. https://en.wikipedia.org/wiki/Computer_forensics

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 COMPUTER FORENSICS FUNDAMENTALS				
1.1	Introduction to Computer Forensics Fundamentals	1	Chalk & Talk	Black Board
1.2	Benefits of Forensics Methodology	1	Chalk & Talk	Black Board
1.3	Users of Computer Forensic Evidence	1	Lecture	PPT
1.4	Military Forensic Technology	2	Chalk & Talk	Black Board
1.5	Specialized Forensics Techniques	1	Discussion	Black Board
1.6	Encryption Methods and Vulnerabilities	1	Lecture	White board
1.7	Internet Tracing Methods	1	Lecture	PPT
1.8	Security and Wireless Technologies	2	Lecture	White board
1.9	Biometric Security Systems.	2	Chalk & Talk	Black Board
UNIT - 2 COMPUTER FORENSICS EVIDENCE AND CAPTURE				
2.1	Data Backup and Recovery	1	Lecture	PPT
2.2	Evidence Collection and Data Seizure	1	Chalk & Talk	Black Board
2.3	Methods of Collection	2	Lecture	PPT
2.4	Collection Steps	2	Lecture	White board
2.5	Controlling Contamination	1	Discussion	Black Board
2.6	Reconstructing the Attack	1	Chalk & Talk	Black Board
2.7	Preservation of Digital Evidence and Digital Crime Scene	1	Chalk & Talk	Black Board
2.8	Computer Evidence Processing Steps	1	Lecture	White board

2.9	Computer Image - Verification and Authentication	1	Discussion	Black Board
2.10	Special Needs of Evidential Authentication	1	Lecture	PPT
UNIT – 3 COMPUTER FORENSICS ANALYSIS				
3.1	Discovery of Electronic Evidenc	1	Lecture	White board
3.2	Electronic Document Discovery: A Powerful New Litigation Tool	2	Chalk & Talk	Black Board
3.3	Forensic Identification and Analysis of Technical Surveillance Devices	2	Lecture	PPT
3.4	How to Become a Digital Detective	1	Lecture	White board
3.5	Useable & Unusable File Formats	1	Lecture	PPT
3.6	Network Forensics Scenario - A Technical Approach	2	Discussion	Google classroom
3.7	Destruction of Email	1	Chalk & Talk	Black Board
3.8	Damaging Computer Evidence	1	Lecture	PPT
3.9	Tools Needed for Intrusion Response to the Destruction of Data	1	Discussion	Google classroom
UNIT - 4 THE IW ARSENAL AND TACTICS OF THE MILITARY				
4.1	Overview of Military Tactics	1	Lecture	PPT
4.2	Offensive Ruinous IW Tools and Tactics	1	Lecture	PPT
4.3	Offensive Containment IW Tools and Tactics	1	Chalk & Talk	Black Board
4.4	Defensive Preventive IW Tools and Tactics	1	Chalk & Talk	Black Board
4.5	Defensive Ruinous IW Tools and Tactics	1	Discussion	Black Board
4.6	Defensive Responsive Containment IW Tools and Tactics	1	Lecture	PPT
4.7	Weapons of the Future	2	Chalk & Talk	Black Board

4.8	Snoop, Sniff, and Snuff Tools	2	Discussion	Google classroom
4.9	IW Weapons of the Future	2	Discussion	Google classroom
UNIT – 5 SURVEILLANCE TOOLS FOR IW OF THE FUTURE				
5.1	Cyber Surveillance	2	Chalk & Talk	Black Board
5.2	Cyber Footprint and Criminal Tracking	1	Lecture	PPT
5.3	Implications of Cookies and Integrated Platforms	2	Lecture	PPT
5.4	Data Mining	1	Lecture	White board
5.5	The Wireless Internet: Friend or Foe.	2	Lecture	White board
5.6	Advanced Encryption: The Need to Conceal	1	Lecture	White board
5.7	Advanced Hacking	1	Lecture	White board
5.8	Advanced Tracker Hackers	1	Discussion	Google classroom
5.9	The Problems of the Present.	1	Chalk & Talk	Black 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	Predict the forensics fundamentals and the various technologies used to avoid computer crimes	K2, K4	PSO1 & PSO3
CO 2	Illustrate different methods to collect and preserve digital evidence and Digital Crime Scene.	K2, K3, K4	PSO2 & PSO5
CO 3	Identify and Analyze Forensic Technical Surveillance Devices.	K2 , K4	PSO3 & PSO4
CO 4	Evaluate the Various tools and tactics followed in military.	K2, K3,K4& K5	PSO2 & PSO4
CO 5	Demonstrate the Usage of surveillance tools for tracking cyber criminals	K2,K3,K4& K5	PSO2 & PSO5

Mapping COs Consistency with PSOs

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

Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

COURSE DESIGNER:

Staff Name – S. JEBAPRIYA



Forwarded By

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	23MCAA M03	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:

4. <https://machinelearningmastery.com/machine-learning-with-python/>
5. [http://ibpsa.fr/jdownloads/Simurex/2015/Presentations/30_03_atelierdata mining.pdf](http://ibpsa.fr/jdownloads/Simurex/2015/Presentations/30_03_atelierdata%20mining.pdf)
6. <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	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 concepts of machine learning	K2, K4	PSO1, PSO2
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	PSO3, 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)

II MCA
SEMESTER – II

(For those who join in 2020 onwards)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/W EEK	CREDITS
MCA	20MCAAM04	NEURAL NETWORKS	SPECIALIZATION ELECTIVE – AI & MACHINE LEARNING	4	4

COURSE DESCRIPTION

This course provides the basic principles of Neural Networks. It will cover Neurocomputing, Layer Perceptron, Pattern Association, HopField Net, Back Propagation Network, Probabilistic Neural Network and Application of Neural Networks

COURSE OBJECTIVE

- ❖ To learn the various fundamental models of artificial neural networks.
- ❖ To have an understanding of Neural Networks and use these for controlling real time systems.
- ❖ To have a basic proficiency to use neural network for application related to design and manufacture.

UNIT – I Introduction to NN and Artificial NN

(12 Hours)

Introduction - Neural Processing - Overview – The Rise of Neurocomputing - Introduction - Artificial Neural Networks - Historical Development of Neural Networks - Biological Neural Networks - Comparison between the brain and the computer - Comparison between artificial and biological Neural Network - Artificial Neural Network Terminologies.

Self Study :Historical Development of Neural Networks

UNIT II Models of Artificial NN&Perceptron Networks (12 Hours)

Introduction - McCulloch-Pitts Neuron Model - Learning Rules – Introduction - Single Layer Perceptron - Brief Introduction to Multilayer Perceptron Networks

Self Study :Single Layer Perceptron

UNIT III Associative Memory Networks (12 Hours)

Introduction - Algorithm for Pattern Association - Hetero Associative Memory Neural Networks - Auto Associative Memory Network.

Self Study: Auto Associative Memory Network

UNIT IV Feedback and Feed forward Network (12 Hours)

Introduction - Discrete HopFiled Net - Continuous Hoppfiled Net – Introduction - Back Propagation Network.

Self Study: Discrete HopFiled Net

UNITV AISpecial Networks Applications of NN (12 Hours)

Introduction - Probabilistic Neural Network – Cognitron – Neocognitron - Boltzman Machine - Boltzman Machine with Learning - Support Vector Machine - Application of Neural Networks in Arts – Bioinformatics – Use of Neural Networks in Knowledge Extraction.

Self Study: Application of Neural Networks in Arts

REFERENCE BOOKS

1. S N Sivanandam, S. Sumathi, S.N.Deepa, “Introduction to Neural Networks”, Tata McGraw – Hill Publishing Company Limited, 2008
2. S.Rajasekaran, G.A.Vijayalakshmi, “Neural Networks, Fuzzu Logic and Genetic Algorithms”, PHP Learning Private Limited, Delhi, 2015.
3. Bart Kosko, “Neural Networks and Fuzzy Systems”, PHP Learning Private Limited, Delhi, 2012.
4. Jhh-shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, Bart Kosko “Neuro-Fuzzy and Soft Computing”, PHP Learning Private Limited, Delhi, 2012.

WEB RESOURCES

1. http://www.soukalfi.edu.sk/01_NeuroFuzzyApproach
2. https:// /Neuro_fuzzy_and_Soft_Computing.html?id=vn5qaaaamaaj
3. https://en.wikipedia.org/wiki/Neural_network

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO NN AND ARTIFICIAL NN				
1.1	Introduction , Neural Processing , Overview	2	Chalk & Talk	Black Board
1.2	The Rise of Neurocomputing , Introduction	2	Chalk & Talk	Black Board
1.3	Artificial Neural Networks , Historical Development of Neural Networks	2	Lecture	White board
1.4	Biological Neural Networks , Comparison between the brain and the computer	2	Chalk & Talk	Black Board
1.5	Comparison between artificial and biological Neural Network	2	Discussion	Black Board
1.6	Artificial Neural Network Terminologies	2	Lecture	White board
UNIT - 2 MODELS OF ARTIFICIAL NN & PERCEPTRON NETWORKS				
2.1	Introduction, McCulloch-Pitts Neuron Model	2	Lecture	PPT
2.2	Learning Rules	3	Chalk & Talk	Black Board
2.3	Introduction	2	Lecture	PPT
2.4	Single Layer Perceptron	3	Lecture	White board
2.5	Brief Introduction to Multilayer Perceptron Networks	2	Discussion	Black Board
UNIT -3 ASSOCIATIVE MEMORY NETWORKS				
3.1	Introduction	1	Lecture	White board
3.2	Algorithm for Pattern Association	1	Chalk & Talk	Black Board

3.3	Hetero Associative Memory Neural Networks	5	Lecture	PPT
3.4	Auto Associative Memory Network	5	Lecture	PPT
UNIT – 4 FEEDBACK AND FEED FORWARD NETWORK				
4.1	Introduction	1	Lecture	PPT
4.2	Discrete HopFiled Net	3	Lecture	PPT
4.3	Continuous Hoppfiled Net	3	Chalk & Talk	Black Board
4.4	Introduction	1	Chalk & Talk	Black Board
4.5	Back Propagation Network	4	Discussion	Black Board
UNIT – 5 AI SPECIAL NETWORKS &APPLICATIONS OF NN				
5.1	Introduction , Probabilistic Neural Network	1	Chalk & Talk	Black Board
5.2	Cognitron	1	Lecture	PPT
5.3	Neocognitron	1	Lecture	PPT
5.4	Boltzman Machine	1	Lecture	White board
5.5	Boltzman Machine with Learning	2	Lecture	White board
5.6	Support Vector Machine	2	Lecture	White board
5.7	Application of Neural Networks in Arts	2	Chalk & Talk	White Board
5.8	Bioinformatics	1	Demonstration	LCD
5.9	Use of Neural Networks in Knowledge Extraction	1	Demonstration	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 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 problems that are amenable to solution by Neural networks methods.	K2, K4	PSO1& PSO2
CO 2	Formulate searching rules and implement Single Layer Perceptron and Multilayer Perceptron Networks.	K2, K3, K4	PSO2 & PS03
CO 3	Design and carry out an empirical evaluation of different algorithms on Pattern Association	K2 , K4	PSO1 & PS04
CO 4	Analyze Feedback and Feed forward Network and implement optimal and efficient solutions.	K2, K3,K4& K5	PS03 & PS05
CO 5	Apply the application of Neural Networks in Arts, Bioinformatics and use of Neural Networks in Knowledge Extraction.	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

Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

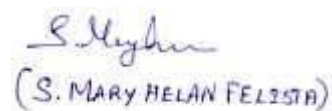
COURSE DESIGNER:

Staff Name – R. SMEETA MARY



Forwarded By

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	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

REFERENCE BOOKS:

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

WEB REFERENCES:

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-usability of E-content	2	Lecture	PPT & 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 AUTHORIZING 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 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	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)

GENERAL ELECTIVE - MCA**(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAGE02	FINANCIAL MANAGEMENT AND ACCOUNTING	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides an overview of financial concepts, process and operations from a managerial perspective.

COURSE OBJECTIVE

- ❖ To define the set of accounting method and disclosure practices from which firms select when providing information to external parties.
- ❖ The primary emphasis is to assist in developing the skills required to interpret, analyze and evaluate information contained in published financial statements.

UNIT I ACCOUNTING**(12 Hours)**

Principles, Basic accounting concepts and conventions, journal, ledger – final accounts.

SELF STUDY: Ledger**UNIT II COSTING****(12 Hours)**

Introduction to costing - cost elements - Classification of costing- Materials - Stock levels – FIFO, LIFO, Simple Average Method, Weighted Average Method (simple problem only)

SELF STUDY: Classification of costing

UNIT III FUND FLOW AND CASH FLOW STATEMENT

(12 Hours)

Meaning –objective- preparation of fund flow statement and cash flow statements.

SELF STUDY: Objective

UNIT IV

(12 Hours)

BUDGET AND BUDGETARY CONTROL:

Nature and scope, Importance.

MARGINAL COSTING:

Nature, scope and importance, Break-even analysis, Uses and limitations.

SELF STUDY: Uses and limitations

UNIT V TALLY

(12 Hours)

Introduction to tally – Accounting Information – Vouchers – Inventory – Purchase/Sales Orders – Invoices – Reports – Important Features of Tally.

SELF STUDY: Invoices

REFERENCES :

1. T.S.Reddy&A.Murthy, “Advanced Accountancy”, Margham Publications , 2nd Revised Edition, 2014.
2. T.S.Reddy&Y.Hari Prasad Reddy, ”Cost Accounting” ,Margham Publications, Fourth Revised Edition, 2015.
3. T.S Reddy &Y.Hari Prasad Reddy, “Management Accounting”, Margham Publications Third Revised Edition- 2014.
4. S. Palanivel,“Tally 9: Accounting Software”, Margham Publications, 2015.
5. A.K.Nadani, “Simple Tally 9” BPB Publications, 2010.
6. R.L.Gupta&M.Radhaswamy, “Advanced accountancy”, Sultan chand& co, 2014.
7. S.N.Maheswari “Principles of Management accounting”, Sultan Chand & co, 2014.
8. R.S.N.Pillai&B.Bagavathi,“Cost accounting”, Sultan Chand & co, 2014.

WEB REFERENCES:

1. [https:// en.wikipedia.org/wiki/Financial_management](https://en.wikipedia.org/wiki/Financial_management)
2. <https://www.managementstudyguide.com/financial-management.htm>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 -Accounting				
1.1	Principles	2	Lecture	Black Board
1.2	Basic accounting concepts and conventions	3	Lecture	White board
1.3	journal	3	Lecture	Black Board
1.4	Ledger	1	Self Study	PPT
1.5	Final accounts.	3	Lecture	Black Board
UNIT 2 - Costing				
2.1	Introduction to costing - cost elements	2	Lecture	PPT
2.2	Classification of costing	1	Self Study	Black Board
2.3	Materials	2	Chalk & Talk	PPT
2.4	Stock levels	2	Lecture	White board
2.5	FIFO, LIFO	2	Chalk & Talk	Black Board
2.6	Simple Average Method	1	Chalk & Talk	Black Board
2.7	Weighted Average Method (simple problem only)	2	Chalk & Talk	Black Board
UNIT 3 - Fund flow and cash flow statement				
3.1	Meaning	3	Lecture	White board
3.2	objective	2	Self Study	Black Board
3.3	preparation of fund flow statement	3	Chalk & Talk	PPT
3.4	cash flow statements	4	Lecture	White board

UNIT 4 -Budget and budgetary control				
4.1	Nature and scope	2	Chalk & Talk	Black Board
4.2	Importance	3	Lecture	PPT
4.3	Nature, scope and importance	2	Chalk & Talk	Black Board
4.4	Break-even analysis	3	Chalk & Talk	PPT
4.5	Uses and limitations.	2	Self Study	Black Board
UNIT -5-Tally				
5.1	Introduction to tally	2	Lecture	Black Board
5.2	Accounting Information	2	Chalk & Talk	Black Board
5.3	Vouchers	2	Lecture	Black Board
5.4	Inventory – Purchase/Sales Orders	2	Chalk & Talk	Black Board
5.5	Invoices	2	Chalk & Talk	Black Board
5.6	Important Features of Tally	2	Chalk & Talk	Black 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	Preparation and analysis of balance sheet.	K2, K4	PSO1 & PSO2
CO 2	Predict the Classification of Costing.	K2, K3, K4	PSO1 & PSO2
CO 3	Decide the budget preparation and control of a company.	K2 , K4	PSO1 & PSO2
CO 4	Analyze the flow of funds.	K2, K3,K4& K5	PSO1 , PS02 & PSO4
CO 5	Use Tally to implement the needs of financial accounting.	K2,K3,K4& K5	PSO1, PS03 & PSO5

Mapping COs Consistency with PSOs

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

Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

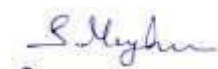
COURSE DESIGNER:

Forwarded By

Staff Name – B. USHA

HOD'S Signature & Name

 B


(S. MARY HELAN FELISTA)

GENERAL ELECTIVE – MCA**(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCAGE03	ORGANIZATIONAL BEHAVIOUR	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides solution to learn challenges and opportunities in organizations from a behavioural perspective.

COURSE OBJECTIVE

- ❖ To develop an Organisational Behaviour model for any type of Organization.
- ❖ To develop and improve the quality of Leadership.
- ❖ To evaluate the Common biases and eradication in Decision Making Process.
- ❖ To understand how to manage the Stress during a job.

UNIT I INTRODUCTION**(12 Hours)**

Introduction to Organizational Behaviour(OB), Contributing disciplines to OB Field, challenges and opportunities for OB, Developing an OB Model, Foundation of Individual Behaviour, Ability - Learning. Values, Attitudes and Types of Attitudes. Job satisfaction- Measuring Job satisfaction, Effect of Job satisfaction on employee performance.

SELF STUDY: Values, Attitudes**UNIT II PERSONALITY AND VALUES****(12 Hours)**

Personality determinants, Achieving personality fit, Factors Influencing perception, Attribution Theory, Perception / Individual Decision Making: Ethics in Decision

Making. Motivation, Management by Objectives, Employee Recognition programs, Employee Involvement programs, Variable Pay Programs.

SELF STUDY: Ethics in Decision Making

UNIT III UNDERSTANDING WORK TEAMS

(12 Hours)

Teams Vs Groups – Types of Teams, Creating Effective Teams – Turning Individuals into Team Players. **Communication:** Functions of Communication, Communication Process – Direction of communication, Interpersonal and Organizational communication, Barriers of effective communication, Current issues in Communication.

SELF STUDY: Communication Process

UNIT IV LEADERSHIP & ORGANIZATIONAL STRUCTURE

(12 Hours)

Leadership – Meaning, Trait Theories – Behavioural Theories, Contingency Theories, Contemporary issues in Leadership, The foundation of leadership. Inspirational approach – Emotional intelligence. Foundations of Organization structure, Meaning of Organizational structure – Common organizational Designs, New Design Options – Organizational Designs and Employee Behaviour

SELF STUDY: Contemporary issues in Leadership

UNIT V

(12 Hours)

ORGANIZATIONAL CULTURE, CHANGE & STRESS MANAGEMENT

Organizational culture: Meaning – Creating and sustaining culture, How employees learn culture, creating an ethical organizational culture, creating a customer responsive culture, spirituality and organizational culture. Organizational change and Stress Management: Approaches to Managing organizational change, Creating a Culture, Change in Business, Work stress and its Management.

SELF STUDY: Work stress

REFERENCES :

1. Stephen P. Robbins, "Organisational Behaviour", 11th Edition, Pearson Education, 2009.
2. Uma Sekaran," Organisational Behaviour", 2nd Edition, Tata McGraw-Hill PublishingCompany Ltd., New Delhi, 2010.
- 3.
4. 2. Sharma, R.A," Organisational Theory and Behaviour", 2nd Edition, Tata McGraw-Hill Ltd.,New Delhi, 2007.

WEB REFERENCES:

1. https://www.tutorialspoint.com/organizational_behavior/index.htm
2. <https://www.geektonight.com/organizational-behavior-tutorial/>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -Introduction				
1.1	Introduction to (OB) Organizational Behaviour	1	Lecture	Black Board
1.2	Contributing disciplines to OB Field	1	Lecture	White board
1.3	Challenges and opportunities for OB	1	Lecture	Black Board
1.4	Developing an OB Model	2	Lecture	Black Board
1.5	Foundation of Individual Behaviour	2	Chalk & Talk	Black Board
1.6	Ability - Learning. Values, Attitudes and Types of Attitudes.	3	Chalk & Talk	Black Board
1.7	Measuring Job satisfaction	1	Chalk & Talk	Black Board
1.8	Effect of Job satisfaction on employee performance	1	Chalk & Talk	Black Board
UNIT 2 - Personality and Values				
2.1	Personality – Personality determinants	2	Lecture	Black Board
2.2	Achieving personality fit	1	Chalk & Talk	Black Board
2.3	Factors Influencing perception	1	Chalk & Talk	Black Board
2.4	Attribution Theory	2	Chalk & Talk	Black Board
2.5	Ethics in Decision Making. Motivation	1	Lecture	Black Board
2.6	Management by Objectives	1	Lecture	Black Board
2.7	Employee Recognition programs	3	Chalk & Talk	Black Board
2.8	Variable Pay Programs	1	Chalk & Talk	Black Board

UNIT 3 - Understanding work teams				
3.1	Teams Vs Groups – Types of Teams	1	Lecture	White board
3.2	Creating Effective Teams – Turning Individuals into Team	1	Chalk & Talk	Black Board
3.3	Functions of Communication	1	Chalk & Talk	Black Board
3.4	Communication Process – Direction of communication	1	Chalk & Talk	Black Board
3.5	Interpersonal and Organizational communication	4	Chalk & Talk	Black Board
3.6	Barriers of effective communication	1	Chalk & Talk	Black Board
3.7	Current issues in Communication	3	Chalk & Talk	Black Board
UNIT 4 - Leadership & Organizational structure				
4.1	Leadership – Meaning	1	Lecture	White Board
4.2	Trait Theories – Behavioural Theories	2	Chalk & Talk	Black Board
4.3	Contingency Theories	2	Chalk & Talk	Black Board
4.4	Contemporary issues in Leadership	1	Chalk & Talk	Black Board
4.5	The foundation of leadership	1	Chalk & Talk	Black Board
4.6	Inspirational approach – Emotional intelligence, Foundations of Organization structure	2	Chalk & Talk	Black Board
4.7	Meaning of Organizational structure – Common organizational Designs	1	Lecture	White Board
4.8	New Design Options – Organizational Designs and Employee Behaviour.	2	Chalk & Talk	Black Board

UNIT -5 Organizational culture, change & Stress Management				
5.1	Organizational culture: Meaning – Creating and sustaining culture	1	Lecture	PPT
5.2	How employees learn culture	1	Chalk & Talk	Black Board
5.3	creating an ethical organizational culture	1	Chalk & Talk	Black Board
5.4	creating a customer responsive culture	2	Chalk & Talk	Black Board
5.5	spirituality and organizational culture	2	Chalk & Talk	Black Board
5.6	Organizational change and Stress Management	1		
5.7	Approaches to Managing organizational change	1	Chalk & Talk	Black Board
5.8	Creating a Culture	1	Lecture	PPT
5.9	Change in Business	1	Lecture	PPT
5.10	Work stress and its Management	1	Chalk & Talk	Black 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	Develop an Organisational Behaviour model for any type of Organization	K2, K4	PSO1 & PSO2
CO 2	Understand the Ethics in Decision Making	K2, K3, K4	PSO2 & PSO4
CO 3	Develop and improve the quality of Leadership	K2 , K4	PSO1 & PSO3
CO 4	Evaluate the Common biases and eradication in Decision Making Process	K2, K3,K4& K5	PSO3 & PSO4
CO 5	Understand how to manage the Stress during a job	K2,K3,K4& K5	PSO2 & PSO5

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	1	2	3	1
CO5	1	2	1	1	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	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

Staff Name – S. Jebapriya

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

GENERAL ELECTIVE – MCA
(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAGE04	E-COMMERCE	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides information on the combination of Internet with E-Commerce, options available for doing business on the Internet, features that helps to build E-Commerce web sites, marketing issues, payment options, security issues and customer service.

COURSE OBJECTIVE

- ❖ To illustrate the management's role and identify strategies involved in an e-commerce model.
- ❖ To provide a fundamental understanding of the different types and key components on business models.
- ❖ To become familiar with state of the art Electronic Model, Payment and Supply Chain Mechanisms..

UNIT – I INTRODUCTION TO ELECTRONIC COMMERCE (12 Hours)

Introduction to electronic commerce - What is electronic commerce?, Benefits of electronic commerce, Impact of electronic commerce, Classification of electronic commerce, Application of electronic commerce technologies.

SELF STUDY :Benefits of Electronic Commerce

UNIT II ELECTRONIC COMMERCE: BUSINESS MODELS (12 Hours)

What is business models?, Native content based models -Information content model, Information exchange model, Transplanted content model - Subscription model, Advertising model, Affiliate model, Native transaction models - Digital products merchant model, Web hosting and internet services, Metamediary , Transplanted transaction models - Electronic store model, Brokerage model.

SELF STUDY :Electronic store model

UNIT III (12 Hours)

ELECTRONIC COMMERCE: NETWORK INFRASTRUCTURE

Local area network, Topologies, Transmission media, Wireless transmission, Wide area network, Internet, TCP/IP reference model.

SELF STUDY :Local area network

UNIT IV ELECTRONIC PAYMENT SYSTEMS (12Hours)

Online payment systems, Pre-paid electronic payment systems - Ecash, Mondex, Milicent, Netbill, Post-paid electronic systems - Ikp, Cybercash, SET, Nettecheque, First Virtual.

SELF STUDY :Milicent

UNITV SECURING NETWORK TRANSACTION (12 Hours)

Transaction security, security services, Cryptology - Introduction to cryptography, Cryptanalysis, Conventional Encryption Model, Public key Cryptosystems, Comparison of conventional and public key encryption systems, Digital signatures, Electronic mail security.

SELF STUDY :Electronic mail security

REFERENCES:

1. Bharat Bhaskar, "Electronic Commerce – Framework Technologies and Applications", Tata McGraw Hill 4th Edition ,2013.
2. P.T. Joseph, "Ecommerce An Indian Perspective", 6th Edition, PHI Learning Pvt. Ltd, 2019.
3. Saimunur Rahman , Introduction to E-Commerce Technology in Business, GRIN Publishing 2014.
4. Amir Manzoor, Ecommerce An Introduction, Lambert Academic Publishing, 2010.

WEB REFERENCES:

1. <https://en.wikipedia.org/wiki/E-commerce>
2. <https://www.shopify.com/encyclopedia/what-is-ecommerce>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO ELECTRONIC COMMERCE				
1.1	Introduction to electronic commerce	2	Chalk & Talk	Black Board
1.2	What is electronic commerce?	2	Chalk & Talk	Black Board
1.3	Benefits of electronic commerce	2	Lecture	White board
1.4	Impact of electronic commerce	2	Chalk & Talk	Black Board
1.5	Classification of electronic commerce	2	Discussion	Black Board
1.6	Application of electronic commerce technologies	2	Lecture	White board
UNIT - 2 Electronic Commerce: Business Models				
2.1	What is business models?	1	Lecture	PPT
2.2	Native content based models	1	Chalk & Talk	Black Board
2.3	Information content model	1	Lecture	PPT
2.4	Information exchange model	1	Lecture	White board
2.5	Transplanted content model	1	Discussion	Black Board
2.6	Subscription model, Advertising model	1	Chalk & Talk	Black Board
2.7	Affiliate model, Native transaction models	2	Chalk & Talk	Black Board
2.8	Digital products merchant model, Web hosting and internet services	2	Lecture	PPT
2.9	Metamediary , Transplanted transaction models	1	Discussion	Black Board

2.10	Electronic store model, Brokerage model	1	Chalk & Talk	Black Board
UNIT – 3ELECTRONIC COMMERCE: NETWORK INFRASTRUCTURE				
3.1	Local area network	1	Lecture	White board
3.2	Topologies	1	Chalk & Talk	Black Board
3.3	Transmission media	2	Lecture	PPT
3.4	Wireless transmission	2	Lecture	White board
3.5	Wide area network	2	Discussion	Black Board
3.6	Internet	2	Lecture	PPT
3.7	TCP/IP reference model	2	Chalk & Talk	Black Board
UNIT - 4 ELECTRONIC PAYMENT SYSTEMS				
4.1	Online payment systems	1	Lecture	PPT
4.2	Pre-paid electronic payment systems	2	Lecture	PPT
4.3	Ecash	1	Chalk & Talk	Black Board
4.4	Mondex	1	Chalk & Talk	Black Board
4.5	Milicent	1	Discussion	Black Board
4.6	Netbill	1	Lecture	PPT
4.7	Post-paid electronic systems - Ikp	1	Chalk & Talk	Black Board
4.8	Cybercash	1	Lecture	PPT
4.9	SET	1	Lecture	PPT
4.10	Netcheque	1	Chalk & Talk	Black Board

4.11	First Virtual	1	Chalk & Talk	Black Board
UNIT – 5 SECURING NETWORK TRANSACTION				
5.1	Transaction security	1	Chalk & Talk	Black Board
5.2	security services	1	Lecture	PPT
5.3	Cryptology	1	Lecture	PPT
5.4	Introduction to cryptography	1	Lecture	White board
5.5	Cryptanalysis	1	Lecture	White board
5.6	Conventional Encryption Model	1	Lecture	White board
5.7	Public key Cryptosystems	1	Lecture	White board
5.8	Comparison of conventional and public key encryption systems	2	Chalk & Talk	Black Board
5.9	Digital signatures	2	Chalk & Talk	Black Board
5.10	Electronic mail security	1	Discussion	Black 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	Gain a comprehensive understanding of the E-Commerce landscape, current and emerging technology and infrastructure underpinnings of the business.	K2, K4	PSO1 & PSO2
CO 2	Analyze the impact of E-commerce on business models and strategy.	K2, K3, K4	PSO3 & PSO4
CO 3	Develop an understanding on how internet can help business grow/ Describe the infrastructure for E-commerce	K2 , K4	PSO1 & PSO3
CO 4	Assess electronic payment systems	K2, K3,K4& K5	PSO4
CO 5	Gain an understanding on the importance of security, privacy, and ethical issues as they relate to E-Commerce.	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	1	1	3	2	1
CO3	2	1	3	1	1
CO4	1	1	1	3	1
CO5	3	1	1	1	2

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	3	2	2	2	3	2	2	3	1	2	3	2
CO3	1	3	2	1	2	3	3	1	3	3	2	3
CO4	2	2	3	3	1	1	3	2	1	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:

Staff Name – P. Nancy Vincentina Mary

P. Nancy

Forwarded By

HOD'S Signature & Name

S. Mary
(S. MARY HELEN FELISTA)

GENERALECTIVE-MCA**(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAGE05	ETHICS IN COMPUTING	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides the basis for ethical decision-making and the methodology for reaching ethical decisions concerning computing matters.

COURSE OBJECTIVE

- ❖ To construct defensible arguments from an ethical point of view concerning the issue of computer hacking.
- ❖ To have an overview knowledge of protective measures against computer crime.
- ❖ To comprehend relevant legislation and international initiatives for equal rights.
- ❖ To compare knowledge of different existing ethics frameworks and professional ethics standards for computer professionals.

UNIT – I INTRODUCTION**(12 Hours)**

Computer Ethics- an overview- Identifying an ethical issue – Ethics and the law – Ethical theories – Professional Codes of conduct – An ethical dilemma – Framework for ethical decision making - Computer Hacking- Introduction – Definitions – Destructive Programs – Hacker Ethics – Legal constraints – Professional Constraints – Ethical positions on hacking – Ethical Dilemma.

SELF STUDY :Activities: Ethics and the law - Arguments against hacking

UNIT -II INTERNET CRIME AND IPR

(12 Hours)

Aspects of Internet Crime - Introduction – What is Computer Crime – computer Security Measures – The Computer misuse Act – Professional duties and obligations - Intellectual property rights - Introduction - The nature of intellectual property - Intellectual property legislation - The extent and nature of software piracy - Ethical and professional issues - Free software and open source code - An ethical dilemma.

SELF STUDY :Researching a computer crime case

UNIT -III INTERNET TECHNOLOGIES AND PRIVACY

(12 Hours)

Regulating Internet content - Introduction - In defence of freedom of expression - Censorship - Laws upholding free speech - Free speech and the Internet - Ethical and professional issues - An ethical dilemma - Personal privacy and computer technologies Introduction - Valuing privacy – Internet technologies and privacy - Privacy legislation - The Data Protection Act, 1998 -Professional and ethical issues - An ethical dilemma

SELF STUDY :Internet Technologies and free expression

UNIT IV EMPOWERING COMPUTERS IN THE WORKPLACE

(12 Hours)

Computer technologies: accessibility issues - Introduction - Principle of equal access -Obstacles to access for individuals - Legislation - Enabling the disabled – Professional responsibility - An ethical dilemma - Empowering computers in the workplace - Introduction - Computers and employment - Computers and the quality of work - Computerised monitoring in the workplace –Telecommuting.

SELF STUDY :Obstacles to equal access – Monitoring illegal activities

UNITV TOWARDS THE FUTURE

(12 Hours)

The failure of IT projects - Introduction - The problems of producing successful IT projects - How the profession is addressing the problem of IT failure - The relationship between professional codes of conduct and IT projects - An overview of national legislation - Towards the future: some ethical and social questions -

Introduction - The database society - Restricting choice: digital rights management
- Review of the ethical dilemmas - The pace of change.

SELF STUDY :Inferring personal information.

REFERENCES

1. Penny Duquenoy, Simon Jones, Barry G Blundell ,“Ethical, Legal and Professional Issues in Computing”, Middlesex University Press, 2008
2. George Reynolds, “Ethics in Information Technology”, 2nd Edition, Thomson CourseTechnology.
3. Charles P .Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”,4th Edition,Pearson Prentice Hall.

WEB REFERENCES:

1. http://www.infosectoday.com/Articles/Intro_Computer_Ethics.htm
2. http://www.tutorialspoint.com/professional_ethics/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	Introduction to Computer Ethics	2	Chalk & Talk	Black Board
1.2	Ethics and the law	2	Chalk & Talk	Black Board
1.3	Ethical theories	2	Lecture	PPT
1.4	Framework for ethical decision making	1	Chalk & Talk	Black Board
1.5	Computer Hacking	1	Discussion	Black Board
1.6	Destructive Programs	1	Lecture	White board
1.7	Hacker Ethics	1	Lecture	PPT
1.8	Ethical positions on hacking	2	Lecture	White board
UNIT - 2 INTERNET CRIME AND IPR				
2.1	What is Computer Crime	1	Lecture	PPT
2.2	Computer Security Measures	1	Chalk & Talk	Black Board
2.3	The Computer misuse Act	2	Lecture	PPT
2.4	Professional duties and obligations	2	Lecture	White board
2.5	Nature of intellectual property	1	Discussion	Black Board
2.6	Intellectual property legislation	1	Chalk & Talk	Black Board
2.7	The extent and nature of software piracy	1	Chalk & Talk	Black Board
2.8	Ethical and professional issues	1	Lecture	White board
2.9	Free software and open source code	2	Discussion	Black Board
UNIT - 3 INTERNET TECHNOLOGIES AND PRIVACY				
3.1	Regulating Internet content	1	Lecture	White board
3.2	Defence of freedom of expression	2	Chalk & Talk	Black Board
3.3	Censorship & Laws upholding free speech	2	Lecture	PPT
3.4	Free speech and the Internet	2	Lecture	White board
3.5	Internet technologies and privacy legislation	2	Lecture	PPT
3.6	The Data Protection Act	2	Discussion	Google classroom
3.7	Professional and ethical issues	1	Chalk & Talk	Black Board

UNIT - 4 EMPOWERING COMPUTERS IN THE WORKPLACE

4.1	Accessibility Issues In Computer Technologies	2	Lecture	PPT
4.2	Principle of equal access	1	Lecture	PPT
4.3	Obstacles to access for individuals	2	Chalk & Talk	Black Board
4.4	Enabling the disabled	1	Chalk & Talk	Black Board
4.5	Professional responsibility	1	Discussion	Black Board
4.6	Computers and employment	1	Lecture	PPT
4.7	Computers and the quality of work	1	Chalk & Talk	Black Board
4.8	Computerised monitoring in the workplace	2	Discussion	Google classroom
4.9	Telecommuting	1	Discussion	Google classroom

UNIT – 5 TOWARDS THE FUTURE

5.1	The failure of IT projects	2	Chalk & Talk	Black Board
5.2	The problems of producing successful IT Projects	2	Lecture	PPT
5.3	Addressing the problem of IT failure	2	Lecture	PPT
5.4	Relationship between professional codes of conduct and IT projects	1	Lecture	White board
5.5	Overview of national legislation	1	Lecture	White board
5.6	Ethical and social questions towards the Future	1	Lecture	White board
5.7	Advanced Hacking	1	Lecture	White board
5.8	The database society	2	Discussion	Black 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	Predict the relationship between the law, ethics and computer technology	K2, K4	PSO1 & PSO3
CO 2	Outline the philosophical and ethical debates with the ideas and the nature of intellectual creativity.	K2, K3, K4	PSO2 & PSO4
CO 3	Design the impact of computer technology on free speech.	K2 , K4	PSO1 & PSO3
CO 4	Formulate the ethical and legal issues of the impact that computing technologies had on workplace.	K2, K3,K4& K5	PSO3 & PSO4
CO 5	Develop a personal standpoint in relation to DataBase society and the usage of biometric data	K2,K3,K4& K5	PSO2 & PSO5

Mapping COs Consistency with PSOs

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

Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

COURSE DESIGNER:

Staff Name – S. JEBAPRIYA



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

GENERAL ELECTIVE – MCA
(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAGE06	RESOURCE MANAGEMENT TECHNIQUES	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides solution to problems in different environment that needs decision making using optimization techniques

COURSE OBJECTIVE

- ❖ To provide the concept and an understanding of basic concepts in Operations Research Techniques for Analysis and Modeling in Computer Applications.
- ❖ To understand, develop and solve mathematical model of linear programming problems.
- ❖ To understand, develop and solve mathematical model of Transport and assignment problems.
- ❖ To understand network modeling for planning and scheduling the project activities

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

Operations Research – An Introduction- Features- Definition- Scientific Method- Models- Methods for solving OR Models- Methodology of OR- Advantages- Applications and Scope- LPP Model formulation – LPP Graphical Solution.

SELF STUDY: Advantages- Applications and Scope

UNIT- I LINEAR PROGRAMMING PROBLEM**(12 Hours)**

LPP - Standard form – Definition- Reduction of Feasible solution to a basic feasible solution- Simplex algorithm (Maximization Case) - Simplex algorithm (Minimization Case).

SELF STUDY: Reduction of Feasible solution to a basic feasible solution

UNIT- II TRANSPORTATION & ASSIGNMENT PROBLEM**(12 Hours)**

Transportation Problem – Initial Basic Feasible solution – North West Corner Method- Least Cost method- Vogel's Approximation Method- MODI Method- Unbalanced Transportation Problem. Assignment Problem – Hungarian Assignment Method

SELF STUDY: Unbalanced Transportation Problem

UNIT- III GAME THEORY**(12 Hours)**

Game Theory- Two persons zero sum game- Games with saddle point- Games without saddle point- Graphical Method- LP Method- The rule of dominance

SELF STUDY: LP Method

UNIT IV PERT & CPM**(12 Hours)**

Project Management: PERT and CPM – Difference between PERT and CPM- Critical Path analysis- Problems in PERT analysis- Project , Time, Cost Trade off- Resource allocation.

SELF STUDY: Difference between PERT and CPM

REFERENCES :

1. J.K. Sharma , “Operations Research- Problems and Solutions”,Macmillan Publishers India Ltd,3 rd Edition, 2009.
2. KantiSwarup ,P.K.Gupta, Manmohan ,“Operations Research”, 13 th Edition, 2008.
3. S. Kalavathy ,“Operations Research”,Vikas publishing house private Ltd, 4th Edition,2013.
4. R. Paneerselvam, “Operations Research”, PHI learning Pvt Ltd, 2nd Edition, 2012.

WEB REFERENCES:

1. <https://lecturenotes.in/subject/573/operations-research-or>
2. <http://www.cs.toronto.edu/~stacho/public/IEOR4004-notes1.pdf>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
Unit -1 INTRODUCTION				
1.1	Operations Research – An Introduction	1	Lecture	Black Board
1.2	Features- Definition- Scientific Method-	1	Lecture	White board
1.3	Models- Methods for solving OR Models	1	Lecture	Black Board
1.4	Methodology of OR- Advantages- Applications and Scope	1	Lecture	Black Board
1.5	LPP Model formulation	4	Chalk & Talk	Black Board
1.6	LPP Graphical Solution.	4	Chalk & Talk	Black Board
UNIT 2 - LINEAR PROGRAMMING PROBLEM				
2.1	LPP - Standard form	2	Lecture	Black Board
2.2	Definition- Reduction of Feasible solution to a basic feasible solution	2	Chalk & Talk	Black Board
2.3	Simplex algorithm (Maximization Case)	4	Chalk & Talk	Black Board
2.4	Simplex algorithm (Minimization Case).	4	Chalk & Talk	Black Board
UNIT 3 –TRANSPORTATION & ASSIGNMENT PROBLEM				
3.1	Transportation Problem	1	Lecture	White board
3.2	Initial Basic Feasible solution – North West Corner Method	1	Chalk & Talk	Black Board
3.3	Least Cost method	1	Chalk & Talk	Black Board
3.4	Vogel's Approximation Method	1	Chalk & Talk	Black Board
3.5	MODI Method	4	Chalk & Talk	Black Board
3.6	Unbalanced Transportation Problem	1	Chalk & Talk	Black Board
3.7	Hungarian Assignment Method	3	Chalk & Talk	Black Board

UNIT 4 - GAME THEORY				
4.1	Game Theory- Two persons zero sum game	1	Lecture	White Board
4.2	Games with saddle point	2	Chalk & Talk	Black Board
4.3	Games without saddle point	2	Chalk & Talk	Black Board
4.4	Graphical Method	2	Chalk & Talk	Black Board
4.5	LP Method	3	Chalk & Talk	Black Board
4.6	The rule of dominance	2	Chalk & Talk	Black Board
UNIT 5 -PERT & CPM				
5.1	Project Management: PERT and CPM	1	Lecture	PPT
5.2	Difference between PERT and CPM	1	Chalk & Talk	Black Board
5.3	Critical Path analysis-	2	Chalk & Talk	Black Board
5.4	Problems in PERT analysis-	3	Chalk & Talk	Black Board
5.5	Project , Time, Cost Trade off	3	Chalk & Talk	Black Board
5.6	Resource allocation	2	Chalk & Talk	Black 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 applications of Operations Research and methods to solve business problems	K2, K4	PSO1 & PSO2
CO 2	Apply linear programming to solve operational problem with constraints	K2, K3, K4	PSO1, PSO2 & PSO4
CO 3	Apply transportation and assignment models to find optimal solution in warehousing and Travelling,	K2 , K4	PSO2 & PSO4
CO 4	Prepare project scheduling using PERT and CPM	K2, K3, K4 & K5	PSO1, PSO2 & PSO3
CO 5	Use optimization concepts in real world problems	K2, K3, K4 & K5	PSO1, PSO2 & PSO5

Mapping COs Consistency with PSOs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

Mapping COs with Pos

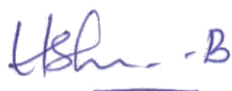
CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	1	1	1	1	1	2	1	1	1
CO2	1	1	1	3	1	1	2	1	1	1	1	1
CO3	1	1	3	1	1	1	1	2	1	1	1	1
CO4	1	3	1	1	1	1	1	1	1	2	1	1
CO5	3	1	1	1	2	1	1	1	1	1	1	1

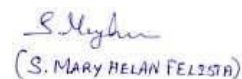
COURSE DESIGNER:

Forwarded By

Staff Name – B. USHA

HOD'S Signature & Name

 - B


(S. MARY HELAN FELISTA)

GENERAL ELECTIVE – MCA**(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAGE07	ENTREPRENEURSHIP DEVELOPMENT	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides the skills necessary to succeed as an entrepreneur. It includes the fundamentals of starting and operating a business, developing a business plan, obtaining financing, marketing a product or service and developing an effective accounting system

COURSE OBJECTIVE

- ❖ Understand the need of entrepreneurial discipline.
- ❖ To let the entrepreneur set or reset the objectives of his business and work individually and along with his group.
- ❖ Analyze the environment set up relating to small industry and business.

UNIT – I ENTREPRENEUR**(12 Hours)**

Introduction – Evolution of the Concept of Entrepreneur – Characteristics of Successful Entrepreneurs – The Charms of Becoming an Entrepreneur – The Entrepreneurial Decision Process – Functions of Entrepreneur – Need for an Entrepreneur- Types of Entrepreneurs- Distinction between an Entrepreneur and a manager –Entrepreneur – Social Entrepreneur.

SELF STUDY :Social Entrepreneur

UNIT II ENTREPRENEURIAL COMPETENCIES

(12 Hours)

Meaning of Entrepreneurial Competency – Major Entrepreneurial Competencies – Developing Entrepreneurial Competencies - Factors Affecting Entrepreneurship Growth: Factors Affecting Entrepreneurship- Economic Factors – Non- economic Factors – Government Actions.

SELF STUDY :Government Actions.

UNIT III WOMEN ENTREPRENEURSHIP

(12 Hours)

Concept of Women Entrepreneur – Functions of Women Entrepreneurs – Growth of Women Entrepreneurship in India – Problems of Women Entrepreneurs – Developing Women Entrepreneurship.

SELF STUDY :Problems of Women Entrepreneurs

UNIT IV EDPS, INSTITUTIONAL FINANCE TO ENTREPRENEURS(12 Hours)

Meaning of EDP – Need for EDPs – Objectives of EDPs – Entrepreneurship Development Programmes (EDPs) in India: A Historical Perspective – Course Contents and Curriculum of EDPs – Phases of EDP- Evaluation of EDPs – Problems of EDPs - Need for Institutional Finance – Institutional Finance- Commercial Banks – Other Financial Institutions.

SELF STUDY :Other Financial Institutions

UNIT V

(12 Hours)

PROJECT APPRAISAL ,FORMULATION OF BUSINESS PLANS

Concept of Project Appraisal – Methods of Project Appraisal – Economic Analysis – Financial Analysis – Market Analysis – Technical Feasibility – Managerial Competence – Environmental Clearance for SMEs – Environmental Restrictions for SSI Sector – The Environmental clearance Process - Meaning of Business Plan- Contents of Business Plan – Significance of Business Plan – Formulation of Business Plan – Planning Commission's Guidelines for Formulating Project Report – Network Analysis – Business Plan Formulation.

SELF STUDY :The Environmental clearance Process

REFERENCES:

1. S SKhanka , “Entrepreneurial Development”, S. Chand Publishing Revised edition ,2020
2. S Anil Kumar, “Entrepreneurship Development” new age international publishers edition, 2003
3. Janakiram B, “Entrepreneurship Development: Text and Cases” Excel Books India, 2011

WEB REFERENCES:

1. https://www.tutorialspoint.com/entrepreneurship_development/entrepreneurship_development_tutorial.pdf
2. https://www.macmillanihe.com/resources/sample-chapters/9781137430359_sample.pdf

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 ENTREPRENEUR				
1.1	Introduction , Evolution of the Concept of Entrepreneur	1	Chalk & Talk	Black Board
1.2	Characteristics of Successful Entrepreneurs	2	Chalk & Talk	Black Board
1.3	The Charms of Becoming an Entrepreneur	1	Lecture	White board
1.4	The Entrepreneurial Decision Process , Functions of Entrepreneur	1	Chalk & Talk	Black Board
1.5	Need for an Entrepreneur	2	Discussion	Black Board
1.6	Types of Entrepreneurs	2	Lecture	White board
1.7	Distinction between an Entrepreneur and a manager	1	Lecture	White board
1.8	Entrepreneur , Social Entrepreneur	2	Discussion	Google classroom
UNIT - 2 ENTREPRENEURIAL COMPETENCIES				
2.1	Meaning of Entrepreneurial Competency	2	Lecture	PPT
2.2	Major Entrepreneurial Competencies	2	Chalk & Talk	Black Board
2.3	Developing Entrepreneurial Competencies	2	Lecture	PPT
2.4	Factors Affecting Entrepreneurship Growth, Factors Affecting Entrepreneurship	2	Lecture	White board
2.5	Economic Factors	2	Discussion	Black Board
2.6	Non- economic Factors	1	Chalk & Talk	Black Board
2.7	Government Actions	1	Chalk & Talk	Black Board

UNIT – 3 WOMEN ENTREPRENEURSHIP				
3.1	Concept of Women Entrepreneur	2	Lecture	White board
3.2	Functions of Women Entrepreneurs	2	Chalk & Talk	Black Board
3.3	Growth of Women Entrepreneurship in India	3	Lecture	PPT
3.4	Problems of Women Entrepreneurs	3	Lecture	White board
3.5	Developing Women Entrepreneurship	2	Discussion	Black Board
UNIT - 4 EDPs, INSTITUTIONAL FINANCE TO ENTREPRENEURS				
4.1	Meaning of EDP , Need for EDPs	2	Lecture	PPT
4.2	Objectives of EDPs	2	Lecture	PPT
4.3	Entrepreneurship Development Programmes (EDPs) in India: A Historical Perspective	2	Chalk & Talk	Black Board
4.4	Course Contents and Curriculum of EDPs , Phases of EDP	3	Chalk & Talk	Black Board
4.5	Evaluation of EDPs , Problems of EDPs	1	Discussion	Black Board
4.6	Need for Institutional Finance , Institutional Finance	1	Lecture	PPT
4.7	Commercial Banks , Other Financial Institutions	1	Chalk & Talk	Black Board
UNIT – 5 PROJECT APPRAISAL , FORMULATION OF BUSINESS PLANS				
5.1	Concept of Project Appraisal , Methods of Project Appraisal	1	Chalk & Talk	Black Board
5.2	Economic Analysis , Financial Analysis	1	Lecture	PPT
5.3	Market Analysis , Technical Feasibility	1	Lecture	PPT
5.4	Managerial Competence , Environmental Clearance for SMEs	1	Lecture	White board
5.5	Environmental Restrictions for SSI Sector	1	Lecture	White board

5.6	The Environmental clearance Process	1	Lecture	White board
5.7	Meaning of Business Plan, Contents of Business Plan	1	Lecture	White board
5.8	Significance of Business Plan	1	Chalk & Talk	Black Board
5.9	Formulation of Business Plan	1	Chalk & Talk	Black Board
5.10	Planning Commission's Guidelines for Formulating Project Report	1	Discussion	Black Board
5.11	Network Analysis	1	Chalk & Talk	Black Board
5.12	Business Plan Formulation	1	Discussion	Black 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	Highlight the salient characteristics of successful entrepreneur	K2, K4	PSO1& PSO2
CO 2	Enumerate the competencies relevant for Entrepreneurial development.	K2, K3, K4	PSO2 & PS03
CO 3	Delineate the growth of women Entrepreneurship in India.	K2 , K4	PSO1 & PS04
CO 4	Identify the major problems faced in conducting EDPs.	K2, K3,K4& K5	PS03 & PS05
CO 5	Discuss the methods of project appraisal used for small scale enterprises.	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

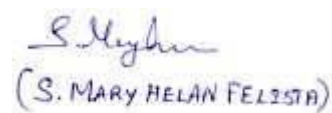
COURSE DESIGNER:

Staff Name – R. SMEETA MARY



Forwarded By

HOD'S Signature & Name



(S. MARY HELEN FELICITA)

I MCA**GENERAL ELECTIVE - MCA****(For those who join in 2023 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	23MCAGE 08	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 - II INTELLIGENT 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 - III SOLVING 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 – IV PLANNING 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., 3rd Edition, 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 2 INTELLIGENT 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 4PLANNING 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, Uncertaintyand 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 Probability	1	Lecture	PPT

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 .	
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	Familiar with Artificial Intelligence, its foundation and principles	K2, K4	PSO1, PSO2
CO 2	Explore the 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	PSO3, 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

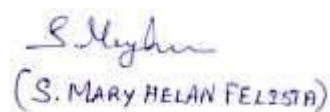
COURSE DESIGNER

DR. R. SMEETA MARY



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

SKILL DEVELOPMENT-100%

GENERAL ELECTIVE – MCA

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAGE09	RESEARCH METHODOLOGY	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides an overview of various methods employed in quantitative and qualitative research.

COURSE OBJECTIVE

- ❖ Understand the basic concepts of research and its methodologies.
- ❖ Identify a research problem stated in a study.
- ❖ Prepare a conventional research report / thesis.

UNIT I INTRODUCTION

(12 Hours)

An Introduction: – Meaning of research – Objective of research – Motivation in research – Types of research – Research approaches – Significance of research – Research methods versus Methodology – Research and scientific method – Importance of knowing how research is done – Research process – Criteria of good research – Problems encountered by researchers in India

SELF STUDY: Types of research

UNIT II DEFINING THE RESEARCH PROBLEM

(12 Hours)

Defining the research problem: What is research problem? – Selecting the problem – Necessity of defining the problem - Research Design: Meaning of research design – Need for research design – Features of a good design – Important concepts relating to research design – Different research designs – Basic principles of experimental designs.

SELF STUDY: Research problem

UNIT III MEASUREMENT AND SCALING TECHNIQUES

(12 Hours)

Measurement and scaling techniques: Measurement in research – Measurement scales – Sources of error in measurement – Tests of sound measurement – Technique of developing measurement tools – scaling – Meaning of scaling – Scale classification bases- Important scaling techniques – Scale construction techniques – Methods of Data Collection: Collection of primary data – Observation method – Interview method – Collection of data through schedules – Difference between Questionnaires and schedules – Some other methods of data collection – Collection of secondary data – Selection of appropriate method for data collection – Case study method

SELF STUDY: Case study method

UNIT IV PROCESSING AND ANALYSIS OF DATA

(12 Hours)

Processing and Analysis of Data: Processing operations – Some problems in processing – Elements/Types of Analysis- Statistics in research – Measures of central tendency – Measures of dispersion – Measures of Asymmetry – Measures of relationship – Simple regression analysis – Multiple correlation and regression – Partial correlation – Association in case of attributes

UNIT V TESTING OF HYPOTHESES

(12 Hours)

What is a Hypothesis? – Basic concepts concerning testing of Hypotheses – Procedure for Hypothesis testing – Measuring the power of a Hypothesis testing – Tests of Hypotheses- Important parametric tests – Hypothesis testing of means – Hypothesis testing for differences between means - Interpretation and report writing: Meaning of interpretation – Why interpretation? – Technique of interpretation – Precaution in interpretation – Significance of report writing – Different steps in writing report – Layout of the research report – Types of reports – Oral Presentation – Mechanics of writing a research report – Precautions for writing research reports

SELF STUDY: Types of reports

REFERENCES :

1. Kothari, C.R (2013), “Research Methodology – Methods and Techniques”, 2ND Edition. Wiley Eastern Limited
2. R. Panneerselvam, “Research Methodology”, 4th Edition. Prentice Hall India Learning Private Limited, 2014
3. Ranjit Kumar, “Research Methodology – A step- by-step guide for beginners”, 3rd Edition. Pearson Education, 2011
4. Deepak Chawla and Neena Sondh , “Research Methodology, Concepts and Cases”, Vikas Publishing House Pvt. Ltd., 2011

WEB REFERENCES:

1. https://edutechwiki.unige.ch/en/Research_methodology_resources
2. <https://csus.libguides.com/>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1		INTRODUCTION		
1.1	Introduction	1	Lecture	PPT
1.2	Meaning of research	1	Lecture	PPT
1.3	Objective of research	1	Lecture	PPT
1.4	Motivation in research	1	Lecture	PPT
1.5	Types of research	1	Lecture	PPT
1.6	Research approaches	1	Lecture	PPT
1.7	Significance of research	1	Lecture	PPT
1.8	Research methods versus Methodology	1	Chalk & Talk	Black Board
1.9	Importance of knowing how research is done	1	Chalk & Talk	Black Board
1.10	Research process	1	Lecture	White board
1.11	Criteria of good research	1	Chalk & Talk	Black Board
1.12	Problems encountered by researchers in India	1	Lecture	White board
UNIT - 2		RESEARCH DESIGN		
2.1	Defining the research problem	1	Lecture	PPT
2.2	What is research problem?	2	Chalk & Talk	Black Board
2.3	Selecting the problem	2	Lecture	PPT
2.4	Necessity of defining the problem.	2	Lecture	White board
2.5	Meaning of research design, Need for research design	1	Discussion	Black Board
2.6	Features of a good design, Important concepts relating to research design	1	Chalk & Talk	Black Board
2.7	Different research designs	1	Chalk & Talk	Black Board

2.8	Basic principles of experimental designs	2	Lecture	PPT
UNIT – 3 MEASUREMENT AND SCALING TECHNIQUES				
3.1	Measurement in research – Measurement scales – Sources of error in measurement	1	Lecture	White board
3.2	Tests of sound measurement – Technique of developing measurement tools	1	Chalk & Talk	Black Board
3.3	Scaling – Meaning of scaling – Scale classification bases	1	Lecture	PPT
3.4	Important scaling techniques – Scale construction techniques	2	Lecture	White board
3.5	Methods of Data Collection: Collection of primary data – Observation method –	1	Discussion	Black Board
3.6	Interview method – Collection of data through schedules	2	Lecture	PPT
3.7	Difference between Questionnaires and schedules – Some other methods of data collection	1	Chalk & Talk	Black Board
3.8	Collection of secondary data – Selection of appropriate method for data collection	1	Chalk & Talk	Black Board
3.9	Case study method	2	Chalk & Talk	Black Board
UNIT - 4 PROCESSING AND ANALYSIS OF DATA				
4.1	Processing operations – Some problems in processing	2	Lecture	PPT
4.2	Elements/Types of Analysis- Statistics in research	2	Lecture	White board
4.3	Measures of central tendency – Measures of dispersion	2	Discussion	Black Board
4.4	Measures of Asymmetry – Measures of relationship	2	Chalk & Talk	Black Board
4.5	Simple regression analysis – Multiple correlation and regression	2	Discussion	Black Board
4.6	Partial correlation – Association in case of attributes	2	Lecture	PPT

UNIT – 5 TESTING OF HYPOTHESES				
5.1	What is a Hypothesis? – Basic concepts concerning testing of Hypotheses - Procedure for Hypothesis testing	2	Chalk & Talk	Black Board
5.2	Measuring the power of a Hypothesis testing – Tests of Hypotheses- Important parametric tests	2	Lecture	PPT
5.3	Hypothesis testing of means – Hypothesis testing for differences between means	2	Lecture	PPT
5.4	Interpretation and report writing: Meaning of interpretation – Why interpretation? – Technique of interpretation	2	Lecture	White board
5.5	Precaution in interpretation – Significance of report writing – Different steps in writing report	2	Lecture	White board
5.6	Layout of the research report – Types of reports – Oral Presentation	1	Lecture	White board
5.7	Mechanics & Precautions for writing research reports	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%

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 different stages of research process.	K2, K4	PSO4
CO 2	Apply methods to collect best data.	K2, K3, K4	PSO1 & PSO2
CO 3	Assess the suitable research design & work.	K2 , K4	PSO4 & PSO3
CO 4	Compare categorical and continuous measures.	K2, K3,K4& K5	PSO3
CO 5	Analyze the process of various reports writing.	K2,K3,K4& K5	PSO3 & PSO4

Mapping COs Consistency with PSOs

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

Staff Name – P.NANCY VINCENTINA MARY

P. Nancy
S. Mary Helan Felista
(S. MARY HELAN FELISTA)

Forwarded By

HOD'S Signature & Name

GENERAL ELECTIVE – MCA
(For those who joined in 2020 onwards)

PROGRAMM E CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCAGE10	DIGITAL IMAGE PROCESSING	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides an introduction to the basic concepts, methodologies and algorithms of digital image processing focusing image enhancement, image analysis and object recognition.

COURSE OBJECTIVES

- ❖ To study the image fundamental principles and mathematical transforms necessary for image processing.
- ❖ To learn the image enhancement, restoration techniques used in digital image processing.
- ❖ To understand about color images and compression techniques

UNIT I**(12 Hours)****INTRODUCTION AND DIP FUNDAMENTALS**

DIP Definition - Origin of DIP- Fundamental steps in DIP - Elements of Visual Perception- Image sampling and Quantization

SELF STUDY: Some basic Relationships between pixels

UNIT II**(12 Hours)****INTENSITY TRANSFORMATION AND SPATIAL FILTERING**

Background- Smoothing spatial filters- Sharpening spatial filters.

SELFSTUDY: basic intensity transformation

UNIT III

(12 Hours)

IMAGE RESTORATION AND RECONSTRUCTION

Model - Restoration in the process of noise only Spatial filtering - mean filters- Order statistic filters- Adaptive filters – Periodic noise reduction by Frequency domain filtering- Band Reject filters - Band pass filter - Notch Filter- Optimum Notch Filtering.

SELFSTUDY :Noise Models

UNIT IV

(12 Hours)

COLOR IMAGE PROCESSING

Color Fundamentals - Color Models – Pseudo color image processing- Basis of full color image processing- Color Transformations - Smoothing and Sharpening Image segmentation based on Color - Noise in color images - Color image compression.

SELF STUDY:Color components

UNIT V

(12 Hours)

IMAGE COMPRESSION

Huffmann Coding- LZW coding- Run Length coding- Digital Image Watermarking.

SELFSTUDY:Arithmetic Coding.

REFERENCES

1. Rafael C. Gonzalez, Richard E.,“Digital Image Processing”, 3rd Edition- Woods Pearson India Education Pvt. Ltd.- 2016
2. Scott Umbaugh, “Computer Vision and Image Processing- a practical approach using CVIP tools”
3. Anil K.Jain, “Fundamentals of Digital Image Processing”, Person Education, 2003.

WEB REFERENCES

1. <https://imagej.net/Welcome>
2. <https://imagej.nih.gov/ij/docs/examples/index.html>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 Introduction and DIP Fundamentals				
1.1	DIP Definition - Origin of DIP	2	Chalk & Talk	Black Board
1.2	Fundamental steps in DIP	2	Chalk & Talk	LCD
1.3	Elements of Visual Perception	4	Lecture	PPT & White board
1.4	Image sampling and Quantization	2	Lecture	Smart Board
1.5	Some basic Relationships between pixels	2	Lecture	Black Board
UNIT -2 Intensity Transformation and spatial filtering				
2.1	Background	2	Chalk & Talk	Black Board
2.2	some basic intensity transformation Functions	2	Chalk & Talk	LCD
2.3	Smoothing spatial filters	4	Lecture	PPT & White board
2.4	Sharpening spatial filters	1	Lecture	Smart Board
2.8	Cell Fundamentals – Frequency Reuse	1	Discussion	Black Board
2.9	Signal to Interference Ratio Calculation.	2	Lecture	Black Board
UNIT -3 Image Restoration and Reconstruction				
3.1	Model – Noise Models	1	Chalk & Talk	Black Board
3.2	Restoration in the process of noise only Spatial filtering	1	Chalk & Talk	LCD
3.3	mean filters- Order statistic filters	4	Lecture	PPT & White board
3.4	Adaptive filters	1	Lecture	Smart Board
3.5	Periodic noise reduction by Frequency domain filtering	1	Lecture	Black Board

3.6	Band Reject filters - Band pass filter	1	Discussion	Google classroom
3.7	Notch Filter	2	Specimen	Microscope
3.8	Optimum Notch Filtering	1	Discussion	Black Board
UNIT –4 Color Image Processing				
4.1	Color Fundamentals	1	Chalk & Talk	Black Board
4.2	Color Models	1	Chalk & Talk	LCD
4.3	Pseudo color image processing	4	Lecture	PPT & White board
4.4	Basis of full color image processing	1	Lecture	Smart Board
4.5	Color Transformations	1	Lecture	Black Board
4.6	Smoothing and Sharpening Image segmentation based on ColorCellular Systems	1	Discussion	Google classroom
4.7	Noise in color images	2	Specimen	Microscope
4.8	Color image compression.	1	Discussion	Black Board
UNIT –5 Image Compression				
5.1	Huffmann Coding	2	Chalk & Talk	Black Board
5.2	Arithmetic Coding	2	Chalk & Talk	LCD
5.3	LZW coding	4	Lecture	PPT & White board
5.4	Run Length coding	2	Lecture	Smart Board
5.5	Digital Image Watermarking.	2	Lecture	Black 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	To review the fundamental concepts of a digital image processing system.	K2, K4	PSO1 & PSO2
CO 2	To examine various types of images, their intensity transformations and spatial filtering.	K2, K3, K4	PSO1 & PSO3
CO 3	To analyze the different types of noises and the filters used to restore and reconstruct the images.	K2 , K4	PSO3 & PSO4
CO 4	To create color images and pseudo images with smoothening and sharpening techniques.	K2, K3,K4& K5	PSO2 & PSO4
CO 5	To compare the various lossy and lossless compression mechanisms.	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	3	1	2	1	1
CO3	1	1	3	2	1
CO4	1	3	1	2	1
CO5	3	1	1	1	2

Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

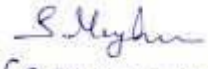
♦ Weakly Correlated -1

COURSE DESIGNER:

Staff Name – S. SELVARANI

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)

GENERAL ELECTIVE - MCA**(For those who joined in 2023 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEEK	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-II CLOUD 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 Storage, Measuring the Digital Universe, Cloud storage in the Digital Universe	1	Flipped Classroom	LMS tool - 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 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
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

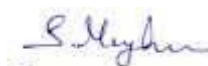
COURSE DESIGNER

Forwarded By

B.USHHA

HOD'S Signature & Name

 -B


(S. MARY HELAN FELISTA)

GENERAL ELECTIVE – MCA**(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCAGE12	AGILE SOFTWARE ENGINEERING	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides an immersive experience in the technical, cultural and social aspects of Agile and DevOps.

COURSE OBJECTIVE

- ❖ To learn the software development process using agile.
- ❖ To comprehend the quality and risk management in software development.
- ❖ To understand the integration between development and operations in software project development.

UNIT I**(12 Hours)****MODERNIZING PROJECT MANAGEMENT**

Project management needed a makeover – Introducing Agile Project Management.

APPLYING AGILE MANIFESTOS & PRINCIPLES

Understanding the Agile Manifesto - Outlining the four values of Agile manifesto-
Defining the 12 Agile principles - Agile Benefits.

AGILE APPROACHES:

Overview of lean- Overview of scrum - Overview of Extreme programming.

SELF STUDY :Agile Benefits

UNIT II

(12 Hours)

AGILE PLANNING AND EXECUTION:

Agile planning – Defining the product vision – Creating a product road map – completing the product backlog.

PLANNING RELEASES AND SPRINTS:

Refining requirements and estimates – Release planning – Sprint planning.

SHOWCASING WORK, INSPECTING AND ADAPTING:

The Sprint review – The sprint retrospective – Preparing for release.

SELF STUDY:Sprint planning

UNIT III

(12 Hours)

MANAGING SCOPE AND PROCUREMENT

Managing Agile scope - Managing Agile procurement

MANAGING TIME AND COST

Managing Agile schedule – Managing Agile budgets

MANAGING AGILE TEAM DYNAMICS& COMMUNICATION

Managing Agile Team Dynamics - Managing Agile communication – Managing Agile quality – Managing Agile risk.

SELF STUDY: Managing Agile communication

UNIT IV FUNDAMENTALS OF DEVOPS

(12 Hours)

The Definition of DevOps – What DevOps is not - Introduction – Traditional Project Setting – Agile Project Setting – Blame Game: Dev vs. Ops – Operations as Bottleneck - DevOps to Rescue – The Essence of DevOps **SELF STUDY:** Quality and testing

UNIT V

(12 Hours)

BUILDING BLOCKS OF DEVOPS

Measurement and Metrics – Improving flow of features – Improve And Accelerate Delivery

QUALITY AND TESTING

What is Quality – Pattern for Improving Quality.

SELF STUDY: Specification by example

REFERENCES :

1. Mark C.Layton , Steven J.Ostermiller , “Agile Project Management”, Wiley Publication II edition ,2018
2. MachaelHuttermann, “DevOps for developers”, Apress publication, 2012
3. Joseph joyner, “DevOps for Beginners” Speedy publishing LLC 2015
4. Robert Martin, “Agile software development, Principles patterns and practices” person new international edition, 2013
5. Greene Jennifer, “Learning Agile” Orielly series I edition 2014

WEB REFERENCES:

1. <https://martinfowler.com/agile.html>
2. <https://refactoring.com/>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 AGILE APPROACHES AND AGILE BEHAVIOURS				
1.1	Modernizing Project Management	2	Lecture	PPT
1.2	Introduction	2	Lecture	PPT
1.3	Applying the Agile Manifesto and Principles- Values	2	Lecture	PPT
1.4	Principles - Agile Benefits	2	Lecture	PPT
1.5	Overview of lean- Overview of scrum	2	Lecture	PPT
1.6	Overview of Extreme programming.	2	Lecture	PPT
UNIT 2 - AGILE PLANNING AND EXECUTION				
2.1	Agile planning – Defining the product vision	1	Lecture	PPT
2.2	Creating a product road map	2	Chalk & Talk	Black Board
2.3	completing the product backlog.	2	Lecture	PPT
2.4	Refining requirements and estimates	2	Lecture	White board
2.5	Release planning – Sprint planning.	1	Discussion	Black Board
2.6	The Sprint review – The sprint retrospective	2	Chalk & Talk	Black Board
2.7	Preparing for release.	2	Chalk & Talk	Black Board
UNIT 3 - AGILE MANAGEMENT				
3.1	Managing scope and procurement	2	Lecture	White board
3.2	Managing Agile scope - Managing Agile procurement	2	Chalk & Talk	Black Board
3.3	Managing time and cost – Managing Agile schedule	2	Lecture	PPT
3.4	Managing Agile budgets – Managing Agile team dynamics	2	Lecture	White board
3.5	Managing Agile communication	2	Discussion	Black Board
3.6	Managing Agile quality – Managing Agile risk.	2	Lecture	PPT

UNIT 4 - FUNDAMENTALS OF DEVOPS				
4.1	The Definition of DevOps – What DevOps is not	2	Lecture	PPT
4.2	Introduction – Traditional Project Setting	2	Discussion	Black Board
4.3	Agile Project Setting – Blame Game	2	Lecture	PPT
4.4	Dev vs. Ops – Operations as Bottleneck	2	Lecture	PPT
4.5	DevOps to Rescue	2	Discussion	Black Board
4.6	The Essence of DevOps	2	Lecture	PPT
UNIT 5 - BUILDING BLOCKS OF DEVOPS				
5.1	Building Blocks OfDevop	2	Discussion	Black Board
5.2	Measurement and Metrics	2	Lecture	PPT
5.3	Improving flow of features	2	Lecture	PPT
5.4	Improve And Accelerate Delivery	2	Lecture	PPT
5.5	Quality And Testing	2	Lecture	PPT
5.6	What is Quality – Pattern for Improving Quality	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 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	Explain the fundamental principles and practices of the agile development methods.	K2, K4	PSO1& PSO2
CO 2	Analyze the planning and execution of the agile manifesto	K2, K3, K4	PSO2 &PSO3
CO 3	Monitor the management to achieve complete product development.	K2 , K4	PSO3 & PSO4
CO 4	Practice the integration of development and operations in software projects.	K2, K3,K4& K5	PSO3 & PSO4
CO 5	Present the software project by following the principles that best fit the technical and market demands.	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	1	2	3	1	1
CO3	1	1	2	2	1
CO4	1	1	3	2	1
CO5	1	1	1	2	3

Mapping of COs with POs

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

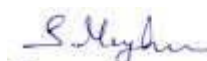
Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

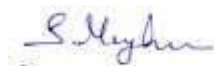
COURSE DESIGNER:

Staff Name – S.MARY HELAN FELISTA


(S. MARY HELAN FELISTA)

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)

EMPLOYABILITY-100%

GENERAL ELECTIVE - MCA

(For those who join in 2023 onwards)

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

Level s	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assess ment
	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 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
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

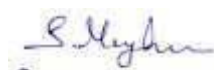
♦ Weakly Correlated -1

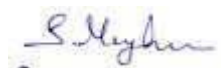
COURSE DESIGNER

S. MARY HELAN FELISTA

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)


(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	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 Cielien, 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:

3. file:///C:/Users/91984/Downloads/R_Notes.pdf
4. <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 Scholastic	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

P.NANCY VINCENTINA MARY



Forwarded By

HOD'S Signature & Name



GENERAL ELECTIVE - MCA**(For those who join in 2023 onwards)**

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/W EEK	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)

QUEUEING ANALYSIS, CONGESTION CONTROL IN DATA NETWORKS AND INTERNETS

Queueing analysis – Queueing 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 – Queueing –
Discipline – FQ – PS – BRFQ – GPS – WFQ – Random Early Detection –
Differentiated services

SELF STUDY: GPS

UNIT - V PROTOCOLS 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

Level s	C1	C2	C3	C4	Total Scholasti c Marks	Non Scholasti c Marks C5	CIA Tota l	% of Assessmen t
	10 Mk s	15 Mk s	5+5=1 0 Mks .	10 Mk s	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

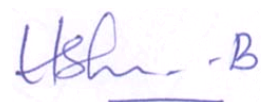
Note: ϕ Strongly Correlated – 3

ϕ Moderately Correlated – 2

ϕ Weakly Correlated -1

COURSE DESIGNER:

B. USHA



Forwarded By

HOD'S Signature & name



(S. MARY HELAN FELISTA)

**I MCA
SEMESTER – II***(For those who joined in 2020 onwards)*

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCA204	Lab III – WEB TECHNOLOGIES	MAJOR LAB	4	2

COURSE DESCRIPTION

This course provides information about two powerful technologies. Together, these two technologies provide a powerful platform for building database-driven Web applications.

COURSE OBJECTIVE

- ❖ To understand how client side and server-side programming works on the web.
- ❖ To Test, debug and deploy web pages containing PHP and MySQL.
- ❖ To create, read and process data in a MySQL database.

LAB LIST

1. Basic programs in HTML5, CSS3, JavaScript and jquery
2. Program for implementing mathematical functions.
3. Program for implementing string functions.
4. Program for Validating Registration Form.
5. Program to create Login form using PHP and MYSQL.
6. Program for online quiz using PHP and MYSQL.
7. Programs for manipulating MYSQL database
8. Program for uploading an image using PHP and MYSQL.
9. Program for Pagination using PHP and MYSQL.
10. Program for Cookie manipulation using PHP.
11. Program for Session manipulation using PHP.

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	Design WebPages using server side scripting.	K1	PSO1, PSO2 & PSO3
CO 2	Use PHP built-in functions and custom functions for processing.	K1, K2,	PSO1, PSO3 & PSO4
CO 3	Create various interactive and dynamic websites	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

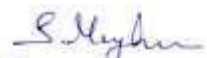
Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated

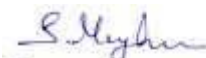
COURSE DESIGNER:

Staff Name – S. MARY HELAN FELISTA


(S. MARY HELAN FELISTA)

Forwarded By

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	CATEGO RY	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: ϕ Strongly Correlated – 3

ϕ Moderately Correlated – 2

ϕ Weakly Correlated -1

COURSE DESIGNER

S. JEBAPRIYA



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

I MCA**SEMESTER – II****(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCA206	SKILL BASED LAB II - R PROGRAMMING	SKILL BASED LAB	2	1

COURSE DESCRIPTION

This course provides an in-depth knowledge on the basic constructs and statistical analysis in R.

COURSE OBJECTIVE

- ❖ Understand the basic constructs of R Programming.
- ❖ Analyze the statistical operations using R.

LAB LIST

1. Exercises to understand the R basics.
2. Exercises to understand the programming constructs of R
3. Exercises to draw a scatter diagram and charts.
4. Exercises to implement statistical operations in R
5. Exercises to implement concepts of probability and distributions in R

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	Demonstrate the practical application of R programming tool.	K1	PSO1& PSO3
CO 2	Emphasize the implementation of statistical operations in R	K1, K2,	PSO2& PSO3

Mapping COs Consistency with PSOs

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

Mapping of COs with POs

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

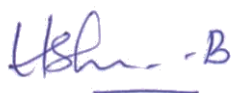
Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

COURSE DESIGNER:

Staff Name – B. USHA

 -B

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)

**MCA
SEMESTER - II**

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/W EEK	CREDITS
MCA	20MCA207	SOFT SKILL II – APTITUDE TRAINING	SOFT SKILL	2	2

COURSE DESCRIPTION

This course provides gamut of skills which facilitate the students to enhance their employability quotient and to establish a stronger connect with the technical environment in which they operate. It makes them think critically and apply basic mathematics skills to interpret data, draw conclusions and solve problems.

COURSE OBJECTIVE

- ❖ To improve aptitude, problem solving skills and reasoning ability.
- ❖ To comprehend the basic concepts of various domains of computer science.

SECTION 1 – ARITHMETIC ABILITY

1. Problems on Numbers
2. Problems on Ages
3. Time and Work
4. Time and Distance
5. Simple Interest
6. Permutation and Combination
7. Odd Man Out & Series

SECTION 2- REASONING

1. Logical Sequence of words
2. Blood Relations Test

3. Series Completion

4. Mirror Images.

SECTION 3- APTITUDE QUESTIONS ON

1. Computer Networks

2. RDBMS

3. Operating Systems

4. Data Structures

5. Object Oriented Programming

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
SECTION 1 – ARITHMETIC ABILITY				
1.1	Arithmetic ability	2	Lecture	White board
1.2	Problems on Numbers	2	Chalk & Talk	Black Board
1.3	Problems on Ages	2	Chalk & Talk	Black Board
1.4	Time and Work	2	Lecture	White board
1.5	Time and Distance	2	Chalk & Talk	Black Board
1.6	Simple Interest	2	Discussion	Black Board
1.7	Permutation	2	Chalk & Talk	Black Board
1.8	Combination	2	Lecture	White board
1.9	Odd Man Out	2	Chalk & Talk	Black Board
1.10	Odd Man Series	2	Lecture	White board
SECTION 2- REASONING				

2.1	Reasoning	2	Chalk & Talk	Black Board
2.2	Logical Sequence of words	2	Chalk & Talk	Black Board
2.3	Blood Relations Test	2	Lecture	White board
2.4	Series Completion	2	Chalk & Talk	Black Board
2.5	Mirror Images.	2	Discussion	Black Board
SECTION 3- APTITUDE QUESTIONS				
3.1	Computer Networks	2	Lecture	White board
3.2	RDBMS	2	Lecture	White board
3.3	Operating Systems	2	Lecture	White board
3.4	Data Structures	2	Lecture	White board
3.5	Object Oriented Programming	3	Lecture	White board

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	Apply quantitative techniques to solve variety of problems.	K1	PSO1& PSO3
CO 2	Enhance the reasoning skills for employability.	K1, K2,	PSO2 & PSO3

Mapping COs Consistency with PSOs

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

Mapping of COs with Pos

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated –2

♦ Weakly Correlated -1

COURSE DESIGNER:

S. JEBAPRIYA



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HOD'S Signature & Nam



(S. MARY HELAN FELISTA)

SKILL DEVELOPMENT – 60%

EMPLOYABILITY - 40 %

II MCA
SEMESTER – III
(For those who join in 2022 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	22MCA302	SOFTWARE ENGINEERING PRINCIPLES	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides the fundamental perception of Software Engineering which includes system requirements, finding the effective methods to analyze, design, code, test and implement the full application with appropriate tools

COURSE OBJECTIVE

- ❖ To provide an insight into software life cycle and various software process models.
- ❖ To understand the methodologies for constructing software with high quality and reliability.
- ❖ To be familiar with estimation and scheduling of projects.

UNIT-I INTRODUCTION TO SOFTWARE ENGINEERING (12 Hours)

Software Engineering Concepts – Development Activities – Managing Software Development – Modelling with UML – Project Organization and Communication Concepts – Organizational Activities.

UNIT-II REQUIREMENTS ELICITATION AND ANALYSIS (12 Hours)

Elicitation Concepts – Elicitation Activities – Analysis Activities – Use Cases to Objects –System Design

UNIT-III SYSTEM DESIGN (12 Hours)

Overview – Design Concepts – Objects to Subsystems – Addressing Design Goals – Managing System Design

UNIT-IV DESIGN INTERFACES AND MAPPING (12 Hours)

Interface Specification – Specification Activities – Managing Object Design – Mapping Models to Code – Mapping Activities – Managing Implementation

UNIT-V TESTING & PROJECT MANAGEMENT (12 Hours)

Testing Concepts – Activities – Managing Test cases –Overview of Project Management – Concepts of Project Management – Classical & Agile Project Management Activities

REFERENCES:

1. Bernd Bruegge Allen H. Dutoit, “Object Oriented Software Engineering Using UML, Patterns and Java”, Third Edition, Prentice Hall, 2010
2. Roger S.Pressman, “Software Engineering (A Practitioner's Approach)”, Tata McGraw-Hill Publishers, 6th Edition, 2014.
3. Bob Hughes and Mike Cotterell, Software Project Management, Fifth Edition, Tata McGraw-Hill Edition 2015
4. Muthuramachandran, Zaigham,. Mohammed, “Software Engineering in the Era of Cloud Computing, Springer Publishers, 2019.

WEB REFERENCES:

1. https://www.tutorialspoint.com/software_engineering/
2. <https://www.geeksforgeeks.org/software-engineering/>

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO SOFTWARE ENGINEERING				
1.1	Software Engineering Concepts	2	Chalk & Talk	Black Board
1.2	Development Activities	2	Lecture	PPT & White board
1.3	Managing Software Development	2	Lecture	PPT & White board
1.4	Modelling with UML	2	Lecture	PPT & White board
1.5	Project Organization and Communication Concepts	2	Lecture	PPT
1.6	Organizational Activities	2	Lecture	PPT
UNIT 2 - REQUIREMENTS ELICITATION AND ANALYSIS				
2.1	Elicitation Concepts	2	Discussion	Black Board
2.2	Elicitation Activities	2	Lecture	Google classroom
2.3	Analysis Activities	2	Lecture	PPT
2.4	Use Cases to Objects	3	Lecture	Smart Board
2.5	System Design	3	Lecture	Black Board
UNIT 3 –SYSTEM DESIGN				
3.1	Overview	2	Discussion	Black Board
3.2	Design Concepts	2	Lecture	PPT
3.3	Objects to Subsystems	2	Lecture	PPT & White board
3.4	Addressing Design Goals	3	Lecture	Smart Board
3.5	Managing System Design	3	Lecture	Black Board
UNIT 4 – DESIGN INTERFACES AND MAPPING				
4.1	Interface Specification	3	Lecture	PPT

4.2	Specification Activities	3	Lecture	PPT
4.3	Managing Object Design	1	Lecture	PPT
4.4	Mapping Models to Code	2	Lecture	PPT
4.5	Mapping Activities	2	Discussion	White Board
4.6	Managing Implementation	1	Lecture	PPT
UNIT -5 – TESTING& PROJECT MANAGEMENT				
5.1	Testing Concepts	2	Lecture	PPT
5.2	Activities – Managing Test cases	2	Lecture	PPT
5.3	Overview of Project Management	2	Lecture	PPT
5.4	Concepts of Project Management	3	Lecture	PPT
5.5	Classical & Agile Project Management Activities	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 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	Understand basic software engineering methods and practices.	K2, K4	PSO1 & PSO2
CO 2	Analyse on software requirements and the SRS documents.	K2, K3, K4	PSO2
CO 3	Identify the data, class and flow oriented modelling concepts.	K2 , K4	PSO3 & PSO4
CO 4	Analyse on the design oriented concepts	K2, K3,K4& K5	PSO1 & PSO4
CO 5	Identify the managerial aspects of Software development.	K2,K3,K4& K5	PSO1 & PSO2

Mapping COs Consistency with PSOs

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

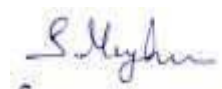
Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

COURSE DESIGNER**S. SELVARANI****Forwarded By****HOD'S Signature & Name**

 (S. MARY HELAN FELISTA)

EMPLOYABILITY - 100 %

II MCA

SEMESTER – III

(For those who join in 2023 onwards)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEE K	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>
4. <https://www.freecodecamp.org/learn/front-end-development-libraries/#react>
5. <https://www.freecodecamp.org/news/learn-mongodb-a4ce205e7739/>

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

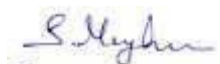
♦ Weakly Correlated -1

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

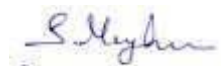
COURSE DESIGNER:

S. Mary Helan Felista


(S. MARY HELAN FELISTA)

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)

II MCA

EMPLOYABILITY - 100 %

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 – Strongly 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 Unleashed, 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 – Strongly 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

Level s	C1	C2	C3	C4	Total Scholas tic Marks	Non Scholastic Marks C5	CIA Total	% of Assess ment
	10 Mks	15 Mks	5+5=10 Mks .	10 Mks	45 Mks .	5Mks .	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	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

P.NANCY VINCENTINA MARY

P. Nancy

Forwarded By

HOD'S Signature

S. Mary Helan Felista
(S. MARY HELEN FELISTA)

II MCA**SEMESTER – III****(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WE EK	CREDITS
MCA	20MCADA05	BUSINESS ANALYTICS USING R	SPECIALIZATION ELECTIVE – DATA ANALYTICS	4	4

COURSE DESCRIPTION

This course provides a comprehensive study on business analytics that can be applied to many business settings and its practical implementation using a tool.

COURSE OBJECTIVES

- ❖ To introduce the principles and concepts of business analytics and R programming
- ❖ To gain a practical knowledge on the concept of supervised and unsupervised machine learning
- ❖ To implement the various techniques of Regression in R.

UNIT – I**(12 HRS.)****OVERVIEW OF BUSINESS ANALYTICS**

Drivers for Business Analytics – Applications of Business Analytics – Skills Required for a Business Analyst – Life cycle of a Business Analytics Project – The Framework for Business Analytics

INTRODUCTION TO R

Data Analysis Tools – R Installation – Basics of R Programming – R object types – Data Structures in R

SELF STUDY :The Framework for Business Analytics , R object types

UNIT – II

(12 HRS.)

R FOR DATA ANALYSIS

Reading and Writing Data – Using Control Structures in R – Working with R Packages and Libraries

INTRODUCTION TO DESCRIPTIVE ANALYTICS

Descriptive Analytics – Population and sample – Statistical parameters of interest – Graphical description of the data – Computations on data frames - Probability

SELF STUDY :Graphical description of the data

UNIT – III

(12 HRS.)

BUSINESS ANALYTICS PROCESS AND DATA EXPLORATION

Business Analytics Life Cycle – Understanding the Business Problem – Collecting and Integrating the Data – Preprocessing the Data – Exploring and Visualizing the Data – Using Modeling Techniques and Algorithms – Evaluating the Model – Presenting a Management Report and Review – Deploying the Model

SELF STUDY :Presenting a Management Report and Review

UNIT – IV

(12HRS.)

SUPERVISED MACHINE LEARNING

Classification and Prediction - Probabilistic Models for Classification - Decision Trees - Other Classifier Types - Classification Example Using R

UNSUPERVISED MACHINE LEARNING

Clustering- Hierarchical Clustering – Non Hierarchical Clustering - Clustering Case Study - Association Rule

SELF STUDY :Other Classifier Types, Association Rule

UNIT – V

(12 HRS.)

SIMPLE LINEAR REGRESSION

Introduction – Correlation – Hypothesis Testing – Simple Linear Regression

MULTIPLE LINEAR REGRESSION

Using Multiple Linear Regression – Using an Alternative Method in R - Predicting the Response Variable - Training and Testing the Model - Cross Validation

LOGISTIC REGRESSION

Logistic Regression– Training and Testing the Model - Multinomial Logistic RegressionRegularization

SELF STUDY :Multinomial Logistic Regression , Regularization

REFERENCES:

1. Dr.Umesh R. Hodeghatta, UmeshaNayak, “Business Analytics Using R – A Practical Approach” Apress Media, 2017
2. A.Ohri, “R for Business Analytics”, Springer, 2012
3. Johannes Ledolter, “Data Mining and Business Analytics with R “John Wiley & Sons Inc., 2013.
4. Dr. Bharti Motwani, “ Data analytics with R”, Wiley India

WEB REFERENCES :

1. <https://www.analyticsvidhya.com/learning-paths-data-science-business-analytics-business-intelligence-big-data/learning-path-r-data-science/>
2. <https://www.sisense.com/glossary/r-analytics/>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT – 1 OVERVIEW OF BUSINESS ANALYTICS & INTRODUCTION TO R				
1.1	Drivers for Business Analytics – Applications of Business Analytics	2	Chalk & Talk	Black Board
1.2	Skills Required for a Business Analyst – Life cycle of a Business Analytics Project	2	PPT	LCD
1.3	The Framework for Business Analytics	2	Flipped Classroom	LCD
1.4	Data Analysis Tools – R Installation	2	PPT	LCD
1.5	Basics of R Programming	2	Group Discussion	White Board
1.6	R object types – Data Structures in R	2	PPT	LCD
UNIT -2 R FOR DATA ANALYSIS & INTRODUCTION TO DESCRIPTIVE ANALYTICS				
2.1	Reading and Writing Data – Using Control Structures in R	3	PPT	LCD
2.2	Working with R Packages and Libraries	2	PPT	LCD
2.3	Descriptive Analytics – Population and sample – Statistical parameters of interest	2	LECTURE	BLACK BOARD
2.4	Graphical description of the data	3	PPT	LCD
2.5	Computations on data frames - Probability	2	PPT	LMS tool – Edmodo and LCD
UNIT -3 BUSINESS ANALYTICS PROCESS AND DATA EXPLORATION				
3.1	Business Analytics Life Cycle – Understanding the Business Problem	2	PPT	LCD AND WHITE BOARD
3.2	Collecting and Integrating the Data – Preprocessing the Data	2	LECTURE	BLACK BOARD
3.3	Exploring and Visualizing the Data – Using Modeling Techniques and Algorithms	2	PPT	LCD
3.4	Evaluating the Model	2	PPT	LCD
3.5	Presenting a Management Report and Review	2	Chalk and Talk	Blackboard
3.6	Deploying the Model	2	PPT	LCD

UNIT – 4 SUPERVISED & UNSUPERVISED MACHINE LEARNING				
4.1	Classification and Prediction	1	Chalk and Talk	Blackboard
4.2	Probabilistic Models for Classification	2	PPT	LCD
4.3	Decision Trees	2	Chalk and Talk	Blackboard
4.4	Other Classifier Types	1	PPT	LCD
4.5	Classification Example Using R	1	PPT	LCD
4.6	Clustering- Hierarchical Clustering – Non Hierarchical Clustering	2	PPT	LCD
4.7	Clustering Case Study	1	PPT	LCD
4.8	Association Rule	2	Flipped Classroom	LCD
UNIT - 5 SIMPLE LINEAR, MULTIPLE LINEAR & LOGISTIC REGRESSION				
5.1	Introduction – Correlation	2	LECTURE	BLACK BOARD
5.2	Hypothesis Testing – Simple Linear Regression	2	LECTURE	BLACK BOARD
5.3	Using Multiple Linear Regression	1	PPT	LCD
5.4	Using an Alternative Method in R - Predicting the Response Variable	2	PPT	LCD
5.5	Training and Testing the Model - Cross Validation	2	PPT	LCD
5.6	Logistic Regression – Training and Testing the Model	2	PPT	LCD
5.7	Multinomial Logistic Regression Regularization	1	PPT	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 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
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- 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	Examine the concepts around Business analytics	K2, K4	PSO1,PS02
CO 2	Evaluate the process of analysing a business descriptively using the tool	K2, K3, K4	PSO2, PSO3
CO 3	Explore data and business analytic process	K2 , K4	PSO1, PSO3
CO 4	Apply various supervised and unsupervised Machine learning techniques	K2, K3,K4 & K5	PSO4, PSO5
CO 5	Learn to apply different algorithms of regression for business problems	K2,K3,K4 & K5	PSO3, 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 COs with POs

CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12
CO1	1	2	3	3	3	1	2	2	1	2	1	2
CO2	2	2	3	2	2	3	3	1	1	2	1	1
CO3	1	3	3	3	3	2	2	1	2	2	1	1
CO4	2	2	2	3	3	2	3	2	1	2	1	2
CO5	3	2	2	2	1	3	3	2	1	2	1	2

Note: ϕ Strongly Correlated – 3

ϕ Moderately Correlated – 2

ϕ Weakly Correlated -1

COURSE DESIGNER:

Staff Name –R. SMEETA MARY



Forwarded By

HOD'S Signature & Name



(S. MARY HELEN FELICIA)

II MCA**SEMESTER – III****(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCADA06	BIG DATA SECURITY	SPECIALIZATION ELECTIVE – DATA ANALYTICS	4	4

COURSE DESCRIPTION

This course provides an overview of the cutting edge and new technologies in the area of big data security.

COURSE OBJECTIVE

- ❖ Understand the significance of privacy and ethics in big data environment
- ❖ Learn about the security issues in Hadoop environment
- ❖ To become familiar with various algorithms for implementing security

UNIT- I**(12 Hours)****SECURITY AND GOVERNANCE FOR BIG DATA ENVIRONMENTS**

Security in context with Big data – Understanding data protection options – Data governance challenge – Putting the right organizational structure in place – Developing a well governed and secured big data environment Big data best practices – Big data do's and don'ts

SELF STUDY: Big data do's and don'ts

UNIT - II**(12 Hours)****HADOOP SECURITY OVERVIEW**

Challenges for securing the hadoop eco system – key security considerations

Hadoop security design : Kerberos – terminologies – advantages – Hadoop security model without Kerberos – Hadoop Kerberos security implementation.

SELF STUDY:key security considerations

UNIT - III

(12 Hours)

SETTING UP A SECURED HADOOP CLUSTER

Setting up Kerberos – configuring hadoop with Kerberos authentication

SECURING THE HADOOP ECO SYSTEM

Configuring kerberos for Hadoop eco system components – securing Hive, Oozie, flume, Hbase, Scoop, Pig

UNIT - IV

(12 Hours)

SECURING SENSITIVE DATA IN HADOOP

Securing insights in Hadoop – Securing data in Motion – Security data in Rest – Implementing data encryption in Hadoop.

SELF STUDY: Security data in Rest

UNIT - V

(12 Hours)

SECURITY EVENT AND AUDIT LOGGING IN HADOOP

Security incident and event monitoring in Hadoop Cluster – Audit logging in a secured Hadoop cluster.

SELF STUDY: Audit Logging

REFERENCES:

1. Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, “Big Data”,Wiley Publications, 2014.
2. Sudeesh Narayanan,“Securing Hadoop”, Packt Publishing, 2013.
3. Tom White, “Hadoop: The Definitive Guide”, Third Edition, O’reilly Media, 2012
4. Mark Van Rijmenam, “Think Bigger: Developing a Successful Big Data Strategy for Your Business “, Amazon, First edition, 2014.
5. Frank Ohlhorst, “Big Data Analytics: Turning Big Data into Big Money”, John Wiley & Sons, John Wiley & Sons, 2013.

WEB REFERENCES:

1. <https://www.sisense.com/glossary/big-data-security/>

2. <https://www.datamation.com/big-data/big-data-security.html>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 SECURITY AND GOVERNANCE FOR BIG DATA ENVIRONMENTS				
1.1	Security and Governance for Big Data environments: Security in context with Big data	2	Lecture	Black Board
1.2	Understanding data protection options – Data governance challenge	2	Lecture	White board
1.3	Putting the right organizational structure in place	3	Lecture	PPT
1.4	Developing a well governed and secured big data environment	3	Lecture	PPT
1.5	Big data best practices	2	Lecture	PPT
UNIT - 2 HADOOP SECURITY OVERVIEW				
2.1	Hadoop Security overview : Challenges for securing the hadoop eco system	2	Lecture	PPT
2.2	key security considerations	2	Chalk & Talk	Black Board
2.3	Hadoop security design : Kerberos – terminologies	2	Lecture	PPT
2.4	Advantages	2	Lecture	White board
2.5	Hadoop security model without Kerberos	2	Discussion	Black Board
2.6	Hadoop Kerberos security implementation	2	Chalk & Talk	Black Board
UNIT-3 SETTING UP A SECURED HADOOP CLUSTER				

3.1	Setting up a secured Hadoop cluster	2	Lecture	White board
3.2	Setting up Kerberos	2	Chalk & Talk	Black Board
3.3	Configuring Hadoop with Kerberos authentication	2	Lecture	PPT
3.4	Securing the Hadoop eco system configuring Kerberos for Hadoop eco system components	3	Lecture	White board
3.5	Securing Hive, Oozie, Flume, Hbase, Scoop, Pig.	3	Discussion	Black Board
UNIT-4 SECURING SENSITIVE DATA IN HADOOP				
4.1	Securing sensitive data in Hadoop	3	Lecture	PPT
4.2	Securing insights in Hadoop	3	Lecture	PPT
4.3	Securing data in Motion	3	Discussion	Black Board
4.4	Implementing data encryption in Hadoop	3	Lecture	PPT
UNIT-5 SECURITY EVENT AND AUDIT LOGGING IN HADOOP				
5.1	Security Event and Audit Logging in Hadoop	4	Lecture	PPT
5.2	Security incident and event monitoring in Hadoop Cluster	4	Lecture	PPT
5.3	Audit logging in a secured Hadoop cluster.	4	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	Identify the need for security and best practices in a big data environment	K2, K4	PSO1 & PSO2
CO 2	Analyze the steps to secure big data	K2, K3, K4	PSO1,PSO2 & PSO3
CO 3	Build security in hadoop eco system	K2 , K4	PSO1,PSO2 & PSO3
CO 4	Assess the sensitivity of data in Hadoop	K2, K3,K4 & K5	PSO1 & PSO4
CO 5	Outline data security and event logging	K2,K3,K4 & K5	PSO4 & PSO5

Mapping COs Consistency with PSOs

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

Mapping COs with POs

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

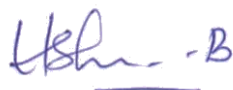
Note: ϕ Strongly Correlated – 3

ϕ Moderately Correlated – 2

ϕ Weakly Correlated -1

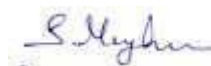
COURSE DESIGNER:

Staff Name – B. USHA

 -B

Forwarded By

HOD'S Signature & Name


(S. MARY HELAN FELISTA)

II MCA**SEMESTER - III****(For those who join in 2020 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCADS05	CLOUD SECURITY	SPECIALIZATION ELECTIVE – DISTRIBUTED SYSTEM SECURITY	4	4

COURSE DESCRIPTION

This course provides a comprehensive study on the unique security challenges and opportunities in cloud platforms and guides through the security best practices for multivendor cloud environments.

COURSE OBJECTIVES

- ❖ To introduce the principles and concepts related to cloud security
- ❖ To gain a practical knowledge on the concept of asset management
- ❖ To understand the issues and security incidents on network security.

UNIT –I**(12 HRS.)****PRINCIPLES AND CONCEPTS**

Least Privilege – Defense in Depth – Threat Actors, Diagrams and Trust Boundaries
– Cloud Delivery Models – The cloud shared responsibility model – Risk management

DATA ASSET MANAGEMENT AND PROTECTION

Data identification and classification – Example Data Classification Levels – Relevant Industry or Regulatory Requirements – Data Asset Management in the Cloud – Protecting Data in the cloud – Tokenization - Encryption

SELF STUDY :Cloud delivery Models, Data Asset Management in the Cloud

UNIT –II

(12 HRS.)

CLOUD ASSET MANAGEMENT AND PROTECTION

Types of Cloud assets – Compute Assets – Storage Assets – Network Assets. Asset management Pipeline – Procurement Leaks – Processing Leaks – Tooling Leaks – Findings Leaks. Tagging Cloud Assets

IDENTITY AND ACCESS MANAGEMENT

Life Cycle for identity and Access – Request –Approve – Create, Delete, Grant or Revoke – Authentication – Authorization – Revalidate – Sample Application

SELF STUDY :Tagging Cloud Assets , Authorization

UNIT –III VULNERABILITY MANAGEMENT

(12 HRS.)

Vulnerable Areas – Finding and Fixing Vulnerabilities – Risk Management Processes – Vulnerability Management Metrics – Change Management – Sample Application

UNIT –IV

(12 HRS.)

DETECTING , RESPONDING TO, AND RECOVERING FROM SECURITY INCIDENTS

What to Watch – Privileged User Access – Logs from Defensive Tooling – Cloud Service Logs and Metrics – Operating System Logs and Metrics – Middleware Logs – Secrets Server. How to Watch – Aggregation and Retention – Parsing Logs – Searching and Correlation – Alerting and Automated Response – Security Information and Event Managers – Thread Hunting. Preparing for an Incident – Responding to an Incident – Recovery – Example Metrics – Example Tools for Detection, Response and Recovery – Sample Application

UNIT V

(12 HRS)

VMWARE CLOUD SECURITY

VMware workspace One Intelligence – Addressing Common vulnerabilities and exposures – VMware Workspace One – Purpose – Secure devices – Loading – Assessing Common Vulnerabilities – Workspace One UEM

AZURE CLOUD SECURITY

Azure Security Centre, Azure Active Directory – VPN Gateway – DDoS Protection – Key vaults – Dedicated HSM – Application Gateways – Sentinel – Information Protection

REFERENCES:

1. Chris Dotson, “Practical Cloud Security” O’Reilly Media, Inc. [ISBN : 9781492037514] , 2019
2. Tim Mather, SubraKumaraswamy, ShahedLatif, “Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance” O'Reilly Media; 1 edition [ISBN: 0596802765], 2009.
3. Ronald L. Krutz, Russell Dean Vines, “Cloud Security” [ISBN: 0470589876], 2010.
4. John W. Rittinghouse, James F. Ransome, Cloud Computing Implementation, Management and Security, CRC Press, 2013.
5. Timothy Grance; Wayne Jansen; NIST “Guidelines on Security and Privacy in Public Cloud Computing”, 2011.
6. Cloud Security Alliance 2010, “Top Threats to Cloud Computing” Microsoft

WEB REFERENCES :

1. https://resources.sei.cmu.edu/asset_files/presentation/2012_017_001_52439.pdf
2. <https://www.simplilearn.com/cloud-network-security-tutorial>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 PRINCIPLES AND CONCEPTS & DATA ASSET MANAGEMENT AND PROTECTION				
1.1	Least Privilege – Defense in Depth – Threat Actors, Diagrams and Trust Boundaries	2	Chalk & Talk	Black Board
1.2	Cloud Delivery Models	1	PPT	LCD
1.3	The cloud shared responsibility model – Risk management	2	Flipped Classroom	LMS tool - and LCD
1.4	Data identification and classification – Example Data Classification Levels	2	PPT	LMS tool - and LCD
1.5	Relevant Industry or Regulatory Requirements	1	Group Discussion	White Board
1.6	Data Asset Management in the Cloud	2	Flipped Classroom	LMS tool - and LCD
1.7	Protecting Data in the cloud – Tokenization - Encryption	2	PPT	LCD
UNIT -2 CLOUD ASSET MANAGEMENT AND PROTECTION& IAM				
2.1	Types of Cloud assets – Compute Assets – Storage Assets – Network Assets.	1	Flipped Classroom	LMS tool – and LCD
2.2	Asset management Pipeline	1	Lecture	White Board
2.3	Procurement Leaks – Processing Leaks- Tooling Leaks – Findings Leaks	1	PPT	White Board
2.4	Tagging Cloud Assets	1	Flipped Classroom	LMS tool – and LCD
2.5	Life Cycle for identity and Access – Request –Approve	2	PPT	CD
2.6	Create, Delete, Grant or Revoke	2	PPT	LCD

2.7	Authorization	2	Self Study	Presentation using PPT
2.8	Authentication - Revalidate – Sample Application	2	PPT	LCD
UNIT -3 VULNERABILITY MANAGEMENT				
3.1	Vulnerable Areas	2	Flipped Classroom	LMS tool - and LCD
3.2	Finding and Fixing Vulnerabilities	2	PPT	White Board
3.3	Risk Management Processes	2	PPT	LMS tool - and LCD
3.4	Vulnerability Management Metrics	2	PPT	LCD
3.5	Change Management	2	Chalk and Talk	Blackboard
3.6	Sample Application	2	PPT	LCD
UNIT 4 - DETECTING , RESPONDING TO, AND RECOVERING FROM SECURITY INCIDENTS				
4.1	What to Watch – Privileged User Access – Logs from Defensive Tooling – Cloud Service Logs and Metrics –	2	Chalk and Talk	Blackboard
4.2	Operating System Logs and Metrics – Middleware Logs – Secrets Server.	2	Chalk and Talk	Blackboard
4.3	How to Watch – Aggregation and Retention – Parsing Logs – Searching and Correlation –	2	Chalk and Talk	Blackboard
4.4	Alerting and Automated Response – Security Information and Event Managers – Thread Hunting.	2	Flipped Classroom	LCD
4.5	Preparing for an Incident – Responding to an Incident – Recovery – Example Metrics – Example Tools for Detection, Response and Recovery –	2	PPT	LCD

4.6	Sample Application	2	PPT	LCD
UNIT - 5 VMWARE & AZURE CLOUD SECURIT				
5.1	VMware workspace One Intelligence	2	Flipped Classroom	LMS tool - and LCD
5.2	Addressing Common vulnerabilities and exposures	1	Flipped Classroom	LMS tool and LCD
5.3	Vmware Workspace One – Purpose – Secure devices – Loading	2	Lecture	PPT
5.4	Assessing Common Vulnerabilities	1	PPT	White Board
5.5	Workspace One UEM	2	Demonstration	White Board
5.6	Azure Security Centre, Azure Active Directory	1	PPT	White Board
5.7	VPN Gateway – DdoS Protection – Key vaults – Dedicated HSM	2	Demonstration	White Board
	Application Gateways - Sentinel – Information Protection	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	Examine the security threats in cloud platforms	K2, K4	PSO3
CO 2	Evaluate Data Asset and Identity Access Management	K2, K3, K4	PSO2, PSO3
CO 3	Manage the vulnerable cloud environment	K2 , K4	PSO1
CO 4	Understand the security issues that arises over a Network	K2, K3,K4& K5	PSO4, PSO5
CO 5	Explore the security incidents by detecting, responding and recovering	K2,K3,K4& K5	PSO3, PSO4

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:

Staff Name – P. Nancy Vincentina Mary

P. Nancy

Forwarded By

HOD'S Signature & Name

S. Mary
 (S. MARY HELEN FELISTA)

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

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/W EEK	CREDIT S
MCA	23MCADS0 6	WEB SECURITY	SPECIALIZ ATION 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 – Certification Authorities	2	Lecture	Smart 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 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	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 COs with POs

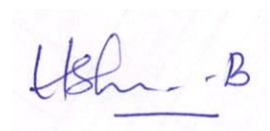
CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1	2	2	2	1	1	1	2	1
CO2	3	2	2	1	1	3	3	1	1	1	3	1
CO3	1	2	1	1	1	2	2	2	1	3	2	2
CO4	1	1	3	2	2	2	1	1	1	1	2	1
CO5	2	2	3	1	1	3	2	1	2	3	1	1

COURSE DESIGNER:

Forwarded By

B.USHA

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

II MCA
SEMESTER – III

(For those who join in 2020 onwards)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/W EEK	CREDITS
MCA	20MCAAM05	HUMAN COMPUTER INTERACTION	SPECIALIZATION ELECTIVE – AI & MACHINE LEARNING	4	4

COURSE DESCRIPTION

This course introduces the fundamental theories and concepts of human computer interaction. It provides knowledge on analyzing interaction problems from a technical, cognitive and functional perspective.

COURSE OBJECTIVE

- ❖ Learn the foundations of Human Computer Interaction
- ❖ Be familiar with the design technologies for individuals and persons with disabilities
- ❖ Be aware of mobile HCI
- ❖ Learn the guidelines for user interface.

UNIT I

(12 Hours)

FOUNDATIONS OF HCI

The Human: Introduction – Input/Output Channels – Human Memory – Thinking: Reasoning and problem solving;

The Computer: Introduction – Text entry Devices – Positioning, pointing and drawing – Display devices – Devices for virtual reality and 3D interaction -Memory – Processing and networks;

SELF STUDY: Devices for virtual reality and 3D interaction

UNIT II

(12 Hours)

THE INTERACTION: Models of interaction – Models of interaction – Frameworks and HCI – Ergonomics – Interaction styles – Elements of the WIMP interface – Interactivity- the context of the interaction

PARADIGMS : Introduction – Paradigms for interaction

Self Study:Interactivity- the context of the interaction

UNIT III

(12 Hours)

INTERACTION DESIGN BASICS:Introduction – the process of design – User focus – the process of design – scenarios – navigation design – screen design – Iteration and prototyping.

HCI IN SOFTWARE PROCESS: Introduction – software life cycle – usability engineering – Prototyping in practice – design rationale.

SELF STUDY:software life cycle

UNIT IV

(12 Hours)

DESIGN RULES: Introduction – principles to support usability- standards - guidelines – rules and heuristics – HCI patterns.

EVALUATION TECHNIQUES: Goals of evaluation – evaluation through expert analysis – evaluation through user participation – choosing an evaluation method.

SELF STUDY: HCI patterns , Choosing an evaluation method.

UNIT V

(12 Hours)

UNIVERSAL DESIGN: Introduction – Universal design principles – Multi modal interaction – Designing web sites for screen readers – choosing the right kind of speech – Designing for diversity

USER SUPPORT: Introduction – Requirements of user support – Approaches to user support –Adaptive help systems

SELF STUDY:Designing for diversity , Approaches to user support

REFERENCES:

1. Alan Dix, Janet Finlay ,“Human-Computer Interaction”,3rdedition, Pearson India
2. Uzma Shaheen, Shweta Saini ,”Human Computer Interaction”, A. B. Publication
3. Dan Olsen, “HUMAN COMPUTER INTERACTION”, CENEAGE LEARNING INDIA PVT LTD
4. Preece, Rogers, Sharp, “Interaction Design : Beyond Human - Computer Interaction”, Wiley Publication
5. Cohen, Jacobs, Shneiderman, Plaisant, “Designing the User Interface: Strategies for Effective Human-ComputerInteraction”, Pearson Education.

WEB RESOURCES:

- 1.<https://www.hcibib.org/>
- 2.<https://www.interaction-design.org/literature/topics/human-computer-interaction>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 FOUNDATIONS OF HCI				
1.1	The Human: Introduction – Input/Output Channels	2	Chalk & Talk	Black Board
1.2	Human Memory	2	Lecture	PPT & White board
1.3	Thinking: Reasoning and problem solving	2	Lecture	PPT & White board
1.4	The Computer: Introduction	2	Lecture	PPT & White board
1.5	Text entry Devices – Positioning, pointing and drawing – Display devices	2	Lecture	PPT
1.6	Devices for virtual reality and 3D interaction -Memory – Processing and networks	2	Lecture	PPT
UNIT 2 - The Interaction & Paradigms				
2.1	Models of interaction Frameworks and HCI	2	Discussion	Black Board
2.2	Ergonomics	2	Lecture	Google classroom
2.3	Interaction styles	2	Lecture	PPT
2.4	Elements of the WIMP interface – Interactivity- the context of the interaction	2	Lecture	Smart Board
2.5	Paradigms - Introduction	2	Lecture	Black Board
2.6	Paradigms for interaction	2	Lecture	PPT & Black board
UNIT 3 – Interaction Design & HCI in software process				
3.1	Interaction Design basics: Introduction	1	Discussion	Black Board
3.2	The process of design – User focus	2	Lecture	PPT
3.3	The process of design – scenarios	2	Lecture	PPT & White board
3.4	Navigation design – screen design – Iteration and prototyping.	3	Lecture	Smart Board

3.5	HCI in software process: Introduction, software life cycle – usability engineering	2	Lecture	Black Board
3.6	Prototyping in practice – design rationale	2	Lecture	PPT
UNIT 4 – Design rules & Evaluation Technique				
4.1	Design rules: Introduction – principles to support usability	3	Lecture	PPT
4.2	standards - guidelines – rules and heuristics	3	Lecture	PPT
4.3	HCI patterns	1	Lecture	PPT
4.4	Evaluation Techniques: Goals of evaluation – evaluation through expert analysis	2	Lecture	PPT
4.5	Evaluation through user participation – choosing an evaluation method.	3	Discussion	White Board
UNIT -5 – Universal Design & User support				
5.1	Universal Design: Introduction – Universal design principles	2	Lecture	PPT
5.2	Multi modal interaction – Designing web sites for screen readers	3	Lecture	PPT
5.3	choosing the right kind of speech – Designing for diversity	2	Lecture	PPT
5.4	User support: Introduction – Requirements of user support	3	Lecture	PPT
5.5	Approaches to user support – Adaptive help systems	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 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	Design effective dialog for HCI	K2, K4	PSO1 & PSO2
CO 2	Design effective HCI for individuals and persons with disabilities	K2, K3, K4	PSO2
CO 3	Assess the importance of user feedback	K2 , K4	PSO3 & PSO4
CO 4	Explain the HCI implications for designing websites	K2, K3,K4& K5	PSO1 & PSO4
CO 5	Develop meaningful user interface	K2,K3,K4& K5	PSO1 & PSO2

Mapping COs Consistency with PSOs

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

Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

COURSE DESIGNER:

Staff Name – P. Nancy Vincentina Mary

P. Nancy

Forwarded By

HOD'S Signature & Name

S. Mary
(S. MARY HELEN FELISTA)

SKILL DEVELOPMENT-100%

II MCA

SEMESTER – III

(For those who join in 2020 onwards)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/W EEK	CREDITS
MCA	20MCAAM06	DEEP LEARNING	SPECIALIZATION ELECTIVE – AI & MACHINE LEARNING	60	4

COURSE DESCRIPTION

The course aims to provide an understanding of different types of Deep Architectures, including Convolutional Networks and Recurrent Networks.

COURSE OBJECTIVE

- ❖ To learn feed forward deep networks
- ❖ To understand convolutional networks and sequence modelling
- ❖ To study auto encoders and representation learning
- ❖ To expose the students to various deep generative models
- ❖ To study the various applications of deep learning

UNIT – I Deep Networks

(12 Hours)

Learning Basics: Learning Algorithms – Supervised Learning Algorithms - Unsupervised Learning Algorithms.

Regularization for Deep Learning: Parameter Norm Penalties – Norm Penalties as Constrained Optimization – Regularization and Under Constrained Problems.

Optimization for Training Deep Models: Challenges In NN Optimization

Self Study : Unsupervised Learning Algorithms

UNIT II Deep Networks : Modern Practices

(12 Hours)

Convolutional Networks – Convolution operation – Motivation - Pooling – Efficient Convolution Algorithms

Recurrent and Recursive Nets: Recurrent neural networks – Deep Recurrent Networks – Recursive Neural Networks – challenge of Long Term Dependencies – Optimization for Long Term Dependencies.

Self Study : Motivation

UNIT III Deep Learning Research

(12 Hours)

Autoencoders: Undercomplete Autoencoders – Regularized Autoencoders – Representational Power, Layer Size and Depth – Stochastic Encoders and Decoders.

Representation Learning: Greedy Layer Wise Unsupervised pretraining – Transfer Learning and Domain Adaptation – Semi Supervised Disentangling of Causal Factors – Distributed Representation – Exponential Gains from Depth – Providing Clues to Discover Underlying Causes.

Self Study: Stochastic Encoders and Decoders

UNIT IV Structured Probabilistic, Monte Carlo Methods

(12 Hours)

Structured Probabilistic Models: Challenges of Unstructured Modeling – Using Graphs to Describe Model Structure – Learning About Dependencies – Inference and Approximate Inference – Deep Learning Approach

Monte Carlo Methods: Sampling and Monte Carlo Methods – Importance Sampling – Markov Chain Monte Carlo Methods – Gibbs Sampling – Challenge of Mixing between Separate Modes

Self Study: Deep Learning Approach

UNIT V Applications

(12 Hours)

Large Scale Deep Learning – Fast CPU Implementations – GPU Implementations – Large Scale Distributed Implementations – Model Compression - Computer Vision - Speech Recognition – Natural Language Processing- n-grams – Neural Language Models – High Dimensional outputs – Neural Machine translation

Self Study: Model Compression

REFERENCE BOOKS

1. Yoshua Bengio and Ian J. Goodfellow and Aaron Courville, "Deep Learning", MIT Press, 2015
2. Li Deng, Dong Yu, "Deep Learning: Methods and Applications", now publishers, 2014.
3. Special Issue on deep learning for speech and language processing, IEEE Transaction on Audio, Speech and Language Processing, vol. 18, iss. 5, 2010

WEB RESOURCES

1. <http://www.deeplearning.net>
2. www.cs.toronto.edu/~fritz/absps/imagenet.pdf
3. <http://neuralnetworksanddeeplearning.com/>

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 DEEP NETWORKS				
1.1	Learning Algorithms	1	Chalk & Talk	Black Board
1.2	Supervised Learning Algorithms	2	Chalk & Talk	Black Board
1.3	Unsupervised Learning Algorithms	1	Lecture	White board
1.4	Regularization for Deep Learning, Parameter Norm Penalties	1	Chalk & Talk	Black Board
1.5	Norm Penalties as Constrained Optimization, Regularization and Under Constrained Problems	2	Discussion	Black Board
1.6	Optimization for Training Deep Models ,Challenges In NN Optimization	2	Lecture	White board
UNIT - 2 DEEP NETWORKS MODERN PRACTICES				
2.1	Convolutional Networks, Convolution operation, Motivation	2	Lecture	PPT
2.2	Pooling ,Efficient Convolution Algorithms	2	Chalk & Talk	Black Board
2.3	Recurrent and Recursive Nets, Recurrent neural networks,Deep Recurrent neural networks	2	Lecture	PPT
2.4	Recursive Neural Networks, challenge of Long Term Dependencies	2	Lecture	White board
2.5	Optimization for Long Term Dependencies	2	Discussion	Black Board
UNIT - 3 DEEP LEARNING RESEARCH				
3.1	Autoencoders,Undercomplete, Regularized Autoencoders	2	Lecture	White board

3.2	Representational Power, Layer Size and Depth, Stochastic Encoders and Decoders	2	Chalk & Talk	Black Board
3.3	Representation Learning, Greedy Layer Wise Unsupervised pretraining	2	Lecture	PPT
3.4	Transfer Learning and Domain Adaptation ,Semi Supervised Disentangling of Causal Factors	2	Lecture	PPT
3.5	Distributed Representation	2	Lecture	White board
3.6	Exponential Gains from Depth	1	Discussion	Black Board
3.7	Providing Clues to Discover Underlying Causes	1	Lecture	White board
UNIT – 4 STRUCTURED PROBABILISTIC, MONTE CARLO METHODS				
4.1	Challenges of Unstructured Modeling	1	Lecture	PPT
4.2	Using Graphs to Describe Model Structure, Learning About Dependencies	2	Lecture	PPT
4.3	Inference and Approximate Inference	2	Chalk & Talk	Black Board
4.4	Deep Learning Approach	1	Chalk & Talk	Black Board
4.5	Monte Carlo Methods, Sampling and Monte Carlo Methods	2	Discussion	Black Board
4.6	Importance Sampling, Markov Chain Monte Carlo Methods	2	Lecture	PPT
4.7	Gibbs Sampling	1	Lecture	White board
4.8	Challenge of Mixing between Separate Modes	1	Discussion	Black Board
UNIT – 5 APPLICATIONS				
5.1	Large Scale Deep Learning, Fast CPU Implementations, GPU Implementations	1	Chalk & Talk	Black Board
5.2	Large Scale Distributed Implementations	1	Lecture	PPT

5.3	Model Compression, Computer Vision	1	Lecture	PPT
5.4	Speech Recognition	1	Lecture	White board
5.5	Natural Language Processing, n-grams	2	Lecture	White board
5.6	Neural Language Models	2	Lecture	White board
5.7	High Dimensional outputs	2	Chalk & Talk	White Board
5.8	Neural Machine translation	2	Demonstration	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 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 problems that are amenable to solution by deep networks	K2, K4	PSO1& PSO2
CO 2	Formulate convolutional networks and sequence modelling for problem solving	K2, K3, K4	PSO2 & PS03
CO 3	Design and carry out an empirical evaluation of autoencoders and representation learning	K2 , K4	PSO1 & PS04
CO 4	Analyze structured probabilistic and Monte Carlo Methods	K2, K3,K4& K5	PS03 & PS05
CO 5	Apply the applications of deep learning.	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

Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

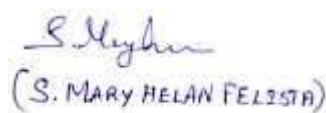
COURSE DESIGNER:

Staff Name – R. SMEETA MARY



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

EMPLOYABILITY – 100%

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 gives overview 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: ϕ Strongly Correlated – 3

ϕ Moderately Correlated – 2

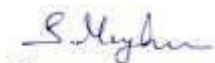
ϕ Weakly Correlated -1

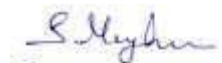
COURSE DESIGNER

Forwarded By

S. Mary Helan Felista

HOD'S Signature & Name


(S. MARY HELAN FELISTA)


(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

P.NANCY VINCENTINA MARY

P. Nancy

Forwarded By

HOD'S Signature & Name

S. Mary
 (S. MARY HELEN FELISTA)

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

PROGRAMM E CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/W EEK	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

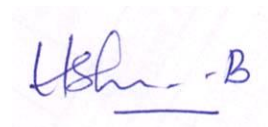
Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

♦ Weakly Correlated -1

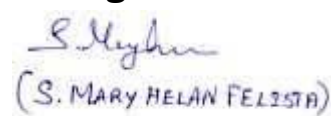
COURSE DESIGNER

B. USHA



Forwarded By

HOD'S Signature & Name



(S. MARY HELAN FELISTA)

II MCA**SEMESTER – III***(For those who joined in 2020 onwards)*

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCA308	SOFT SKILL III – INTERPERSONAL SKILLS FOR CORPORATE READINESS	SOFT SKILL	2	2

COURSE DESCRIPTION

This course provides the skills needed to find a job and also the skills needed to excel at the time of entering a career.

COURSE OBJECTIVES

- ❖ To impart the importance of Interpersonal skills in the working environment

UNIT- I Simulating an Interview

Telephone Interviews

- How to dress
- Body language
- Case Interview

UNIT - II Team Skills Development

- Quick plan exercise
- Group connections activity
- Coded team communication activity
- Personality tree exercise
- Management and leadership training

UNIT – III Time Management Skills

- Individual Target achievement activity
- Group Target activity

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 Simulating an Interview				
1.1	Telephone Interviews	1	Chalk & Talk	Black Board
1.2	How to dress	1	Chalk & Talk	LCD
1.3	Body language	4	Lecture	PPT & White board
1.4	Case Interview	1	Lecture	Smart Board
UNIT -2 Team Skills Development				
2.1	Quick plan exercise	1	Lecture	Green Board Charts
2.2	Group connections activity	2	Chalk & Talk	Green Board
2.3	Coded team communication activity	1	Lecture	Smart Board
2.4	Personality tree exercise	1	Lecture	Black Board
2.5	Management and leadership training	2	Discussion	Google classroom
2.1	Quick plan exercise	1	Lecture	Green Board Charts
2.2	Group connections activity	2	Chalk & Talk	Green Board
2.3	Coded team communication activity	1	Lecture	Smart Board
2.4	Personality tree exercise	1	Lecture	Black Board
2.5	Management and leadership training	2	Discussion	Google classroom
UNIT -3 Time Management Skills				
3.1	Individual Target achievement activity	5	Discussion	Google classroom
3.2	Group Target activity	4	Discussion	Google classroom

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 skills for producing high quality etiquettes at the time of interviews	K2	PSO1, PSO4
CO 2	Exhibit competencies expected by employers	K2, K3, K4	PS04
CO 3	Demonstrate emotional intelligence and inter cultural competencies and to be ready to work in teams	K2, K3& K5	PSO4 &PSO5

Mapping COs Consistency with PSOs

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

Mapping of COs with POs

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

Note: ♦ Strongly Correlated – 3

♦ Moderately Correlated – 2

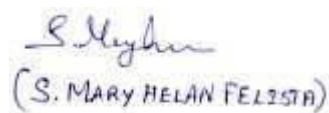
♦ Weakly Correlated -1

COURSE DESIGNER

Forwarded By

B.USHA

HOD'S Signature&Name



(S. MARY HELAN FELISTA)

II MCA**SEMSTER IV****SELF LEARNING COURSER FOR ADVANCED LEARNERS****(For those who joined in 2023 onwards)**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAAL01	INTERNET OF THINGS	ADVANCED LEARNERS	-	2

COURSE DESCRIPTION

This course provides the knowledge required to design an IOT system to connect embedded sensors.

COURSE OBJECTIVE

- Learn the fundamentals of IoT
- Understand the design methodology of IoT applications
- Design IoT applications using Raspberry Pi

UNIT - I FUNDAMENTALS OF IOT**(12 Hours)**

Introduction-Characteristics-Physical design – Things in IoT - Protocols – Logical design of IoT – Functional blocks – communication models – communication APIs – IoT Enabling technologies – IoT Levels and deployment templates.

UNIT – II DOMAIN SPECIFIC IOT**(12 Hours)**

Domain Specific IoTs – Introduction – Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health and Life styleIoT and M2M – Introduction – M2M – Difference between IoT and M2M - SDN and NFV for IoT.

UNIT – III IOT PLATFORMS DESIGN METHODOLOGY (12 Hours)

Introduction – IoT Design Methodology-IoT physical devices and Endpoints – IoT Device – Raspberry Pi – Linux on Raspberry Pi - Raspberry Pi interfaces – Programming Raspberry Pi with Python.

UNIT – IV (12Hours)

IOT PHYSICAL SERVERS AND CLOUD OFFERINGS

Introduction to cloud storage models and communication API s – Python web application framework –Django – Designing a RESTful web API – Amazon web services for IoT

UNIT – V (12 Hours)

CASE STUDIES AND REAL-WORLD APPLICATIONS

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Amazon Web Services for IoT.

REFERENCES:

1. ArshdeepBahga, Vijay Madisetti,“Internet of Things – A hands-on approach”, Hyderabad Universities Press, 2015.
2. HonboZhou,“The Internet of Things in the Cloud : A Middleware Perspective”, Newyork : CRC Press , 2012.
3. D. Jeya Mala, “Integrating the Internet of Things into Software Engineering best practices”, IGI Global Publishers, UK, 2019.
4. Dieter Uckelmann; Mark Harrison; Florian Michahelles (Eds.) “Architecting the Internet of Things”, Germany: Springer,2011.

5. David Easley and Jon Kleinberg, “ Networks, Crowds, and Markets: Reasoning About a Highly Connected World” United Kingdom: Cambridge University Press, 2010.
6. Olivier Hersent, Omar Elloumi and David Boswarthick, “The Internet of Things: Applications to the Smart Grid and Building Automation”, United States : Wiley Publishing Inc, 2012.

WEB REFERENCES:

1. <https://lecturenotes.in/subject/370/internet-of-things-iot>
2. <http://www.cs.ust.hk/~qianzh/FYTGS5100/spr2013/notes/Chapter1-IoT.pdf>

Level s	C1	C2	C3	C4	Total Scholasti c Marks	Non Scholasti c Marks C5	CIA Tota l	% of Assessmen t
	10 Mk s	15 Mk s	5+5=1 0 Mks .	10 Mk s	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 Fundamentals of Internet of Things.	K2, K4	PSO1 & PSO2
CO 2	Design a portable IoT using relevant protocols.	K2, K3, K4	PSO1 & PSO2
CO 3	Analyze applications of IoT in real time scenario.	K2 , K4	PSO3 & PSO5
CO 4	Develop web services to access/control IoT devices.	K2, K3,K4 & K5	PSO3 & PSO4
CO 5	Deploy an IoT application and connect to the cloud.	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	1	1	2	1	3
CO4	1	1	3	2	1
CO5	1	1	1	3	2

Note: ϕ Strongly Correlated – 3

ϕ Moderately Correlated – 2

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Mapping of COs with POs

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

COURSE DESIGNER:

Forwarded By

P.NANCY VINCENTINA MARY

HOD'S Signature & Name

P. Nancy

S. Mary
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