FATIMA COLLEGE (AUTONOMOUS)

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

NAME OF THE DEPARTMENT : DEPARTMENT OF MCA

NAME OF THE PROGRAMME : MCA

PROGRAMME CODE : MCA

ACADEMIC YEAR : 2023 – 2024

FATIMA COLLEGE (AUTONOMOUS), MADURAI

DEPARTMENT OF MCA

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

Members Present

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

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

ACTION TAKEN REPORT FOR 2022-2023

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

CHANGE OF COURSE TITLE : NIL

NEW COURSES INTRODUCED

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

REVISED COURSES

S.NO.	Course Code	Course Title	NO. & Title of Units Revised	% of Revision	Need for Revision	Relev. LRNG	Scope
1.	20MCA 101	Mathematical Foundation of Comp. Science	Unit V - Trees Properties of Trees Spanning Trees	10%	Trees to be included in Graph Theory	G1	SD
2.	20MCA 104	Programming in Python	Unit V - Exception handling.	20%	concepts more detailed	G1	EMP
3.	20MCA 202	Web Technologies	Unit I	20%	Basics moved to Bridgelouse	G1	EMP
4.	20MCA 203	Programming in Java	Unit I & II Rearranged	20%	Topics re-aligned for easy learning	G1	EMP
5.	20MCA 304	Enterprise Application Development	Unit II - Spring, & Hibernate Framework	20%	Topics revamped to facilitate Learning	G1	EMP
6.	20MCA GE11	Cloud Computing	Unit I - V	20%	Topics revamped for easy learning	G1	SD

MINUTES - 2023 ONWARDS

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

NIL

3. Revision of Courses

Revised Courses

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

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

4. New Courses Introduced :

New Courses Introduced

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

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

* 20MCA401 - Final (IV) Semester to be dedicated for Major Project.

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

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

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

6. Approval of Ph.D Course Work Syllabus NIL

7. Rubrics for Internship / Project

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

Details of Proposed / Signed MoUs

1. The Department of MCA propose to extend the MoU with Bricksteel Enterprises Infotech pvt. Ltd., Bangalore for the following activities
   - → Inplant Training
   - → Guest Lectures
   - → Placement
   - → FDP
   - → Skill embedded Value added Course
2. The Department propose to extend the MoU with Vivara Tech, Chennai for e-content development.
3. The Department has planned to Sign more MoUs in the upcoming year.

OTHER SUGGESTIONS

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

COMMENDATIONS

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

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

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

03/04/2023

VISION

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

MISSION

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

VISION OF THE DEPARTMENT

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

MISSION OF THE DEPARTMENT

- Training in the cutting edge technologies to adapt to the Dynamic IT world
- Promoting a learning community in a supportive and caring environment that lead students to successfully complete their goals
- Build up Leadership traits among students
- Craft responsible Computer Professionals with strong Moral Values

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

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

PROGRAMME OUTCOMES (PO)

The learners would be able to

PO 1	Apply the knowledge of computing maths and science for the solution of problems and requirements
PO 2	Identify, critically analyze, formulate and develop computer applications using fundamental principles of relevant domain disciplines
PO 3	Design and evaluate solutions for computer based problems to meet the desired needs within realistic constraints such as safety, security and applicability
PO 4	Use research based knowledge to conduct experiments and interpret data to attain well-defined conclusions.
PO 5	Create, select and apply modern computing tools by understanding the limitations, with dexterity.
PO 6	Demonstrate the competency in programming skills as per industry expectations.
PO 7	Understand the impact of system solutions in societal, environmental and cultural issues within local and global contexts for sustainable development
PO 8	Commit to professional ethics and cyber regulations, responsibilities & norms.
PO 9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary environment to manage projects.
PO 10	Communicate effectively with the society about computing technologies.
PO 11	Demonstrate knowledge and understanding of the management principles and apply these to manage projects.
PO 12	Appreciate the importance of goal setting and to recognize the need for life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSO)

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

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

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
SEMESTER – I						
20MCA101	Mathematical Foundation of Computer Science	4	4	50	50	100
23MCA102	Relational Database Management System	4	4	50	50	100
20MCA103	Operating Systems	4	4	50	50	100
23MCA104	Programming in Python	4	4	50	50	100
*	**Elective I – Specialization**	**4**	**4**	**50**	**50**	**100**
23MCA105	Lab I - RDBMS	6	3	50	50	100
23MCA106	Lab II – Python Programming	6	3	50	50	100
20MCA107	Skill Based Lab I–Linux	2	1	25	25	50
20MCA108	Soft Skills I- Professional Communication	2	2	25	25	50
20MCA109	Comprehensive Viva - I	-	1	-	50	50
	Total Credits		**30**			**850**
SEMESTER – II						
20MCA201	Data Structures and Algorithms	4	4	50	50	100
23MCA202	Computer Networks & Communication	4	4	50	50	100
23MCA203	Programming in Java	4	4	50	50	100
*	**Elective II – Specialization**	4	4	50	50	100
*	**Elective I – General**	4	4	50	50	100
20MCA204	Lab III – Web Technologies	6	3	50	50	100
23MCA205	Lab IV- Java Programming	6	3	50	50	100
20MCA206	Skill Based Lab II - R Programming	2	1	25	25	50
20MCA207	Soft Skills II- Aptitude Training	2	2	25	25	50
20MCA208	Comprehensive Viva - II	1	1	-	50	50

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

ELECTIVES

SPECIALIZATION ELECTIVE – DATA ANALYTICS

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

SPECIALIZATION ELECTIVE – DISTRUIBUTED SYSTEM SECURITY

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

SPECIALIZATION ELECTIVE – AI & MACHINE LEARNING

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

GENERAL ELECTIVES

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

EXTRA CREDIT COURSES (FOR ADVANCED LEARNERS)

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

OLD

REVISION 20 %

I MCA

SEMESTER – I

(For those who joined in 2021 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 is Operating System? – System Organization – System Architecture – System Structure – Protection and Security – Distributed Systems – Special Purpose Systems – Process Overview – Process Scheduling – Process Operations – Inter process Communication.

SELF STUDY: Inter process Communication

UNIT – II PROCESS CO-ORDINATION (12 Hours)

CPU Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Synchronization - Background – Critical Section Problem – Peterson's Solution - Synchronization Hardware – Semaphore Problems – Monitors Deadlock – System Model – Deadlock Characterization – Methods for Handling – Prevention – Avoidance – Detection – Recovery from Deadlock.

SELF STUDY: Monitors

UNIT – III MEMORY MANAGEMENT (12 Hours)

Memory Management - Background – Swapping – Contiguous Memory Allocation – Paging – Structure of Page Table – Segmentation - Virtual Memory - Copy-on-Write - Page Replacement algorithms – Basic – FIFO – Optimal – LRU – LRU Approximation – Counting Based – Page Buffering.

SELF STUDY: Demand Paging.

UNIT - IV FILE SYSTEM MANAGEMENT (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: Free Space Management

UNIT – V STORAGE MANAGEMENT (12 Hours)

Disk Structure – Disk Attachment - Disk Scheduling – Disk Management – Swap-space Management – RAID Structure – I/O Systems - I/O Hardware – I/O interface – I/O Subsystem - I/O Request to hardware operations.

SELF STUDY: Swap-space Management

REFERENCES:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles", Wiley Publication, 7th 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	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 – Distributed Systems	1	Lecture	Smart Board
1.5	Process Overview – Process Scheduling	1	Lecture	Black Board
1.6	Process Operations	2	Discussion	Google classroom
1.7	Inter process Communication	2	Lecture	PPT & White board
UNIT -2 PROCESS CO-ORDINATION				
2.1	CPU Basic Concepts	1	Lecture	Green Board Charts
2.2	Scheduling Criteria – Algorithms	2	Chalk & Talk	Green Board
2.3	Synchronization - Background	1	Lecture	Smart Board
2.4	Critical Section Problem – Peterson ‘s Solution	1	Lecture	Black Board
2.5	Synchronization Hardware – Semaphores	2	Discussion	Google classroom
2.6	Problems – Monitors - Deadlock	1	Lecture	Green Board Charts
2.7	Deadlock Characterization – Methods for Handling	2	Chalk & Talk	Green Board

2.8	Avoidance – Deadlock Detection	1	Lecture	Smart Board
2.9	Recovery from Deadlock	1	Lecture	Black Board
UNIT –3 MEMORY MANAGEMENT				
3.1	Memory Management – Background	1	Chalk & Talk	Black Board
3.2	Swapping – Contiguous Memory Allocation	1	Chalk & Talk	LCD
3.3	Paging – Structure of Page Table	3	Lecture	PPT & White board
3.4	Segmentation	1	Lecture	Smart Board
3.5	Virtual Memory	1	Lecture	Black Board
3.6	Demand Paging – Copy-on-Write	1	Discussion	Google classroom
3.7	Page Replacement algorithms	2	Lecture	PPT & White board
3.8	FIFO – Optimal – LRU – LRU Approximation	1	Discussion	Black Board
3.9	Counting Based – Page Buffering.	1	Lecture	Black Board
UNIT –4 FILE SYSTEM 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	1	Discussion	Black Board
4.9	Free Space Management	1	Lecture	Black Board
UNIT – 5 STORAGE MANAGEMENT				
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 Scholasti	5
	50

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

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

EVALUATION PATTERN

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

- **CIA Components**

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

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the 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 C0s 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)

NEW

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 Scholasti	5
	50

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

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

EVALUATION PATTERN

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

- **CIA Components**

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

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the 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**

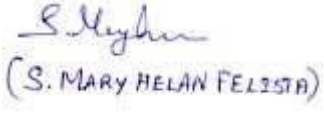
♦ Weakly Correlated -**1**

COURSE DESIGNER

S. JEBAPRIYA

Forwarded By

HOD'S Signature & Name



OLD

REVISION – 20%

I MCA

SEMESTER - II

(For those who join in 2021 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAAM01	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 ability to write simple to intermediate programs in expert systems through scikit learn tools.

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-IISEARCH TECHNIQUES (12Hours)

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-IIIUSING 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-IVFILLER 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 (12 Hours)

AI LEARNING, EXPERT SYSTEMS AND SCIKIT-LEARN

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- 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: 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 2SEARCH 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 4FILLER 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,	2	Chalk & Talk	Black

	additional refinements			Board
4.8	Iterative Deepening.	1	Lecture	PPT
UNIT5AI LEARNING AND EXPERT SYSTEMS				
5.1	What is Learning , ROTE Learning	1	Chalk & Talk	Black Board
5.2	Learning by Taking Advice , Learning in Problem solving	1	Lecture	PPT
5.3	Explanation based Learning , Discovery	1	Lecture	PPT
5.4	Analogy , Formal Learning Theory	1	Lecture	White board
5.5	Expert Systems, Representing and using domain knowledge	1	Lecture	White board
5.6	Expert System Shells, Explanation	1	Lecture	White board
5.7	Scikit-Learn ,Introduction, Modelling process	1	Chalk & Talk	White Board
5.8	Data Representation, Estimator API	1	Demonstration	LCD
5.9	Conventions, Linear Modelling	1	Demonstration	LCD
5.10	Support Vector Machine, Classification with Naïve Bayes	1	Demonstration	LCD
5.11	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 Scholasti	5
	50

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

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

EVALUATION PATTERN

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

- **CIA Components**

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

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify problems that are amenable to solution by AI methods.	K2, K4	PSO1,PS02
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	Apply the concepts of Expert Systems in machine learning, Examine and Explore scikit learn techniques	K2,K3, K4& K5	PS03, PSO4

Mapping COs Consistency with PSOs

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

Mapping of COs with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER

R. SMEETA MARY

Forwarded By

HOD'S Signature & Name

(S. MARY HELAN FELISTA)

NEW

I MCA

SEMESTER - I

(For those who join in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAAM01	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 - IISEARCH 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 - IIIUSING 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 – IVFILLER 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:

4. http://en.wikipedia.org/wiki/Artificial_intelligence
5. http://www.cee.hw.ac.uk/~alison/ai3notes/subsection2_6_2_3.html
6. 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 2SEARCH 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	2	Discussion	Black

	Problem.			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 4FILLER 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
UNIT5AI 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 Scholasti	5
	50

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

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

EVALUATION PATTERN

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

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

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

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Explore problems that are amenable to solution by AI methods.	K2, K4	PSO1,PS02
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	PS03, PSO4

Mapping COs Consistency with PSOs

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

Mapping of COs with POs

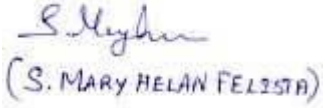
CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	1	1	3	1	2	1	1	1	1	1	1	1
CO3	1	3	1	1	1	1	1	2	1	1	1	1
CO4	1	3	1	1	1	2	1	1	1	1	1	1
CO5	3	1	1	1	1	1	2	1	1	1	1	1

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

♦ Weakly Correlated -**1**

COURSE DESIGNER **Forwarded By**

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



OLD

REVISION – 20%

II MCA

SEMESTER – III

(For those who join in 2020 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 BIG DATA TECHNOLOGY COMPONENTS (12 Hours)

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 GETTING STARTED WITH HADOOP (12 Hours)

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

SETTING UP THE HADOOP ENVIRONMENT– Choosing a Hadoop Distribution – Hadoop cluster architecture

SELF STUDY: Fraud Detection

UNIT – IV STORING DATA IN HADOOP : THE HDFS (12 Hours)

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

READING AND WRITING DATA

Compressing Data – Managing files – Ingesting Log Data

MAPREDUCE PROGRAMMING

Importance – Doing things in parallel – Writing Map Reduce Applications

SELF STUDY: Compressing Data

UNIT – V HADOOP AND DATA WAREHOUSE (12 Hours)

Compare & Contrast Hadoop with Relational Databases - Modernizing the warehouse with Hadoop

STORING DATA IN HBASE

HBase – Understanding HBase Data model – Understanding the HBase architecture – Test run – HBase and RDBMS –Deploying HBase

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. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, 2015.
4. Sridhar Alla, "Big Data Analytics with Hadoop 3", Packt Publishing,2018.

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 – Data Warehouse Modernization	2	Lecture	PPT
3.4	Fraud Detection – Risk Modeling – Social Sentiment Analysis – Image Classification	2	Lecture	White board
3.5	Setting up the Hadoop environment – Choosing a Hadoop Distribution	2	Discussion	Black Board
3.6	Hadoop cluster architecture	2	Lecture	PPT
UNIT 4 - STORING DATA IN HADOOP				
4.1	Storing data in Hadoop - Data Storage in HDFS – HDFS federation	3	Lecture	PPT
4.2	HDFS High Availability	2	Lecture	PPT
4.3	Compressing Data – Managing files – Ingesting Log Data	2	Lecture	Black Board
4.4	MapReduce programming - Importance	2	Lecture	PPT
4.5	Doing things in parallel – Writing Map Reduce Applications	3	Lecture	White board
UNIT -5 HADOOP AND DATA WAREHOUSE				
5.1	Compare & Contrast Hadoop with Relational Databases	2	Lecture	PPT
5.2	Modernizing the warehouse with Hadoop	2	Lecture	PPT
5.3	HBase – Understanding HBase Data model	2	Lecture	PPT
5.4	Understanding the HBase architecture	2	Lecture	White board
5.5	Test run – HBase and RDBMS –	2	Lecture	PPT
5.6	Deploying HBase	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 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, Explore and deploy Hbase	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 DESIGNR **Forwarded By**

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

S. Mary Helan Felista

(S. MARY HELAN FELISTA)

S. Mary Helan Felista

(S. MARY HELAN FELISTA)

NEW

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

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 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 DESIGNR **Forwarded By**

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

S. Mary Helan Felista)

S. Mary Helan Felista)

OLD

REVISION – 20%

II MCA

SEMSTER IV

SELF LEARNING COURSER FOR ADVANCED LEARNERS

(For those who joined in 2020 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 – Heath

and Life style - IoT 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 IOT PHYSICAL SERVERS AND CLOUD OFFERINGS (12Hours)

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

UNIT – V CASE STUDIES ILLUSTRATING IOT DESIGN (12 Hours)

Introduction – Home automation – Cities – Environment – Agriculture – Productivity Applications.

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.

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

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

CIA	
Scholastic	45
Non Scholasti	5
	50

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

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

EVALUATION PATTERN

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

- **CIA Components**

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

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	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**

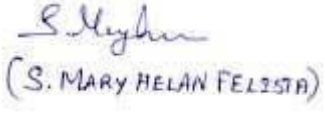
ϕ Weakly Correlated -**1**

Mapping of C0s with POs

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



NEW

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 – Heath and Life style

IoT 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

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

CIA	
Scholastic	45
Non Scholasti	5
	50

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

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

EVALUATION PATTERN

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

- **CIA Components**

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

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	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**

ϕ Weakly Correlated -**1**

Mapping of C0s with POs

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