

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

Re-accredited **(3rd Cycle)** with Grade **A⁺** & **CGPA 3.51** by NAAC

DEPARTMENT OF COMPUTER APPLICATIONS



CBCS with OBE

MASTER OF COMPUTER APPLICATIONS

PROGRAMME CODE - OMC

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)



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CRITERION - I

1.2.2 Details of Programmes offered through Choice Based Credit System (CBCS) / Elective Course System

**Syllabus copies with highlights of contents focusing on
Elective Course System**



To be Noted:

HIGHLIGHTED	COURSE
<div></div>	Elective

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI-14.**(An Autonomous Institution – Affiliated to Madurai Kamaraj University)****Re-accredited (3rd Cycle) with Grade A⁺ & CGPA 3.51 by NAAC****CBCS with OBE****DEPARTMENT OF COMPUTER APPLICATIONS - PG****(w.e.f. 2022-2023 Batch onwards)****VISION**

To achieve brilliance in Professional Education. To make students as Software Professionals with strong understanding in essentials and shine in latest technologies

MISSION

- To develop innovative ideas, talents, problem solving skills, leadership quality among the students.
- To create industrial interaction to improve the entrepreneurship skills.
- To teach the students with latest trends, tools and technologies.
- To strengthening the attitudes and soft skills of the students and encourage resource based projects to the students.

Programme Educational Objectives (PEOs) : M.C.A

PEO	On Completion of the Programme , the student will be able to
PEO1	Utilizing strong technical aptitude and domain knowledge to develop smart software solutions for the upliftment of society.
PEO2	To equip the students to meet the requirement of Corporate world and Industry standard .
PEO3	Showing continuous improvement in their professional career through life-long learning, appreciating human values and ethics.
PEO4	To engage in professional development and to pursue post graduate education in the fields of Information Technology and Computer Applications.
PEO5	To provide the students about computing principles and business practices in software solutions, outsourcing services, public and private sectors
PEO6	Create Software systems that meet specified Design and Execution requirements

Programme Outcomes (POs) with Graduate Attributes

PO	Graduate Attributes	On Completion of the Programme , the students will be able to
PO1	Knowledge Base	Identify and analyze the computing requirements of a problem and to solve those using computing principles.
PO2	Problem Analysis & Investigation	Use suitable architecture or platform on design and implementation with respect to performance.
PO3	Communication Skills & Design.	Programme is designed in such a way that students are able to code the programs themselves , think logically and execute it.
PO4	Individual and Team Work	Apply the management principles with computing knowledge to manage the projects in multidisciplinary environments.
PO5	Professionalism, Ethics and equity	Identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.
PO6	Life Long Learning	Expertise in developing application with required domain knowledge

Programme Specific Outcomes (PSOs) with Graduate Attributes

PSO	Graduate Attributes	On Completion of the Programme, the student will be able to
PSO 1	Knowledge Base	Develop the skill to apply knowledge of mathematics, computer science and management in practice.
PSO 2	Problem Analysis & Investigation	An ability to enhance not only comprehensive understanding of the theory but its application too in diverse field.
PSO 3	Communication Skills & Design.	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
PSO 4	Individual and Team Work	Acquire specific Knowledge on various software learned during the course and to develop projects in multidisciplinary environment
PSO 5	Professionalism, Ethics and equity	Learn to design a computing system to meet desire needs within realistic constraints in multidisciplinary teams with positive attitude.
PSO 6	Life Long Learning	Appreciate the importance of goal setting and to recognize the need for life-long learning .

Eligibility for Admission

Qualifying Exam : Candidates should have Bachelor's Degree of three-year duration from any recognized college.

Eligibility : Candidates must have Mathematics at 10+2 or graduation level.

Duration of the Course

The students shall undergo prescribed course of study for the period of two academic years under **CBCS** semester pattern with **Outcome Based Education**.

Medium of Instruction : English

System : Choice Based Credit System with **Outcome Based Education**

Courses of Study with Credit Distribution

Category	No. of Courses	No. of Credits
Core	20	64
Elective	4	16
Inter Disciplinary Course	2	4
Project	1	6
Total	27	90

Nature of the Course

Courses are classified according to the following nature

1. Knowledge & Skill
2. Employability Oriented
3. Entrepreneurship Oriented

Outcome Based Education (OBE) & Assessment

Students understanding must be built on and assessed for wide range of learning activities, which includes different approaches and are classified along several bases, such as

1. Based on purpose:

- Continuous Internal Assessment - **CIA** (Internal tests, Assignment, Seminar, Quiz, Documentation, ICT based Assignment, Mini Projects administered during the learning process)
- Summative (Evaluation of students learning at the end of instructional unit)

2. Based on Domain knowledge: (Post Graduate Up to K5 Levels)

- Assessment through K1, K2, K3, K4 & K5

Evaluation (Theory)

Continuous Internal Assessment Test (CIA)	:	25 Marks
Summative Examination	:	75 Marks
Total	:	100 Marks

CIA - Continuous Internal Assessment : 25 Marks

Components	Marks
Test (Average of three tests) (I Assessment Conducted for 30 Marks , II and III Assessments for 60 Marks each and 150 Marks is converted into 15 Marks)	15
Assignment	5
Seminar	5
Total	25

- ✓ Centralized system of Internal Assessment Tests
- ✓ There will be three Internal Assessment tests
- ✓ Duration of I Internal Assessment test is 1 hours 30 Minutes and for II and III Assessments will be 2 hours 30 Minutes
- ✓ Students shall write retest on the genuine grounds if they are absent in either Test I or Test II or Test III with the approval of Head of the Department

Question Paper Pattern for Continuous Internal Assessment Test I

Section	Marks
A - Multiple Choice Questions (4 x 1 Mark)	4
B - Short Answer (3 x 2 Marks)	6
C - Either Or type (2/4 x 5 Marks)	10
D - Open Choice type (1/ 2 x10 Marks)	10
Total	30

Question Paper Pattern for Continuous Internal Assessment Test II and Test III

Section	Marks
A – Multiple Choice Questions (8 x 1Mark)	8
B – Short Answer (6 x 2 Marks)	12
C – Either Or type (4/8 x 5 Marks)	20
D – Open Choice type (2/4 x 10 Marks)	20
Total	60

Conducted for 150 Marks and converted into 15 Marks

Question Paper Pattern for Summative Examination:

Section	Marks
A - Multiple Choice Questions type (10 x 1 Mark)	10
B - Short Answer type without choice (5 x 2 Marks)	10
C - Either Or type (5/10 x 5 Marks)	25
D - Open Choice type (3 out of 5 x 10 Marks)	30
Total	75

Evaluation (Practical)

Internal	:	40 Marks
External (Summative)	:	60 Marks
Total	:	100 Marks

Question Paper Pattern for Internal Practical Examination : 40 Marks and
External Practical Examination : 60 Marks

Internal	
Components	Marks
Major Question	20
Minor Question	10
Record Work	5
Program Explanation / VIVA	5
Total	40

External	
Components	Marks
Major Question	30
Minor Question	20
Record Work	5
Program Explanation / VIVA	5
Total	60

- In respect of Summative Examinations passing minimum is **45%** for Post Graduate.
- Latest amendments and revisions as per **UGC** and **TANSCHÉ** norms are taken into Consideration in Curriculum Preparation.

Distribution of Marks in % with K levels CIA I, II, III & External Assessment

Blooms Taxonomy	Internal Assessment			External Assessment
	I	II	III	
Knowledge(K1)	8%	8%	8%	5%
Understanding(K2)	28%	12%	8%	14%
Apply(K3)	44%	40%	24%	27%
Analyze(K4)	20%	40%	40%	27%
Evaluate(K5)	-	-	20%	27%

BLUE PRINT FOR INTERNAL ASSESSMENT - I
Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 1	Up to K 4	2 2	K1 K2	1 1 1	K1 K2 K3	2 (K2) 2(K3) (Each set of questions must be in the same level)	1(K3) 1(K4)	
No. of Questions to be asked			4		3		4	2	13
No. of Questions to be answered			4		3		2	1	10
Marks for each question			1		2		5	10	
Total Marks for each section			4		6		20	20	50

BLUE PRINT FOR INTERNAL ASSESSMENT – II
Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 2	Up to K 4	2 2	K1 K2	1 2	K1 K2	2(K3) 2(K4)	1(K3) 1(K4)	
2	CLO 3	Up to K 4	2 2	K1 K2	1 2	K1 K2	2(K3) 2(K4) (Each set of questions must be in the same level)	1(K3) 1(K4)	
No. of Questions to be asked			8		6		8	4	26
No. of Questions to be answered			8		6		4	2	20
Marks for each question			1		2		5	10	
Total Marks for each section			8		12		40	40	100

BLUE PRINT FOR INTERNAL ASSESSMENT – III
 Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 4	Up to K5	2	K1	1	K1	2(K3)	1(K4)	
			2	K2	1	K2	2(K4)	1(K5)	
					1	K3			
2	CLO 5	Up to K5	2	K1	1	K1	2(K3)	1(K4)	
			2	K2	1	K2	2(K4)	1(K5)	
					1	K3			
No. of Questions to be asked			8		6		8	4	26
No. of Questions to be answered			8		6		4	2	20
Marks for each question			1		2		5	10	
Total Marks for each section			8		12		40	40	100

Distribution of Marks with choice K Levels CIA I, CIA II and CIA III

CIA	K Levels	Section- A MCQ (No choice)	Section -B Short Answer (No choice)	Section- C (Either or Type)	Section-D (Open Choice)	Total Marks	% of Marks
I	K1	2	2			4	8
	K2	2	2	10	-	14	28
	K3		2	10	10	22	44
	K4				10	10	20
	Marks	4	6	20	20	50	100
II	K1	4	4			8	8
	K2	4	8			12	12
	K3			20	20	40	40
	K4			20	20	40	40
	Marks	8	12	40	40	100	100
III	K1	4	4			8	8
	K2	4	4			8	8
	K3		4	20		24	24
	K4			20	20	40	40
	K5				20	20	20
	Marks	8	12	40	40	100	100

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for Internal Assessment (IDC)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No choice)		Short Answers (No choice)		(Either/or Type)	(Open choice)	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 1	Up to K4	2	K1			2(K3&K3)	1(K3)	
2	CLO 2	Up to K4	2	K1			2(K3&K3)	1(K4)	
3	CLO 3	Up to K4			2	K2	2(K4&K4)	1(K4)	
4	CLO 4	Up to K5			2	K2	2(K5&K5)	1(K5)	
5	CLO 5	Up to K5			2	K2		1(K5)	
No. of Questions to be asked			4		3		8	5	20
No. of Questions to be answered			4		3		4	2	13
Marks for each question			1		2		5	10	
Total Marks for each section			4		6		20	20	50 (Marks)

Distribution of Section-wise Marks with K Levels for Internal Assessment (IDC)

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
K1	4				4	4
K2		6			6	6
K3			20	10	30	30
K4			10	20	30	30
K5			10	20	30	30
Total Marks	4	6	40	50	100	

K1- Remembering and recalling facts with specific answers.

K2- Basic understanding of facts and stating main ideas with general answers.

K3- Application oriented- Solving Problems, Justifying the statement and deriving Inferences.

K4- Examining, analyzing, presentation and make inferences with evidences.

K5- Evaluating, making Judgments based on criteria.

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment

Sl. No	CLOs	K-Level	Section A		Section B		Section C	Section D	Total
			MCQs (No choice)		Short Answers (No choice)		(Either/or Type)	(Open choice)	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 1	Up to K4	2	K1&K 2	1	K1	2 (K2& K2)	1(K3)	
2	CLO 2	Up to K4	2	K1&K 2	1	K2	2(K3& K3)	1(K4)	
3	CLO 3	Up to K4	2	K1&K 2	1	K3	2 (K3 &K3)	1(K4)	
4	CLO 4	Up to K5	2	K1&K 2	1	K4	2 (K4 & K4)	1(K5)	
5	CLO 5	Up to K5	2	K1&K 2	1	K5	2 (K5 & K5)	1(K5)	
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75 (Marks)

Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
K1	5	2	-	-	7	5
K2	5	2	10	-	17	14
K3	-	2	20	10	32	27
K4	-	2	10	20	32	27
K5	-	2	10	20	32	27
Total Marks	10	10	50	50	120	100

K1- Remembering and recalling facts with specific answers.

K2- Basic understanding of facts and stating main ideas with general answers.

K3- Application oriented- Solving Problems, Justifying the statement and deriving Inferences.

K4- Examining, analyzing, presentation and make inferences with evidences.

K5- Evaluate , making Judgments based on criteria.

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COURSE STRUCTURE - SEMESTER WISE

Sem	Category	Course Code	Title of the Course	Teaching Hours / Week	Duration of Exam (hrs)	Marks Allotted			Credits
						CIA	SE	Total	
I	Core	22OPCA11	Mathematical Foundation of Computer Applications	5	3	25	75	100	4
	Core	22OPCA12	Object Oriented Programming using C++	4	3	25	75	100	4
	Core	22OPCA13	Relational Database Management Systems	5	3	25	75	100	4
	Core	22OPCA14	Data Structures and Algorithms	5	3	25	75	100	4
			DSEC - I	5	3	25	75	100	4
	Core	22OPCA11P	Data Structures and Algorithms using C++ Lab	5	3	40	60	100	2
	Core	22OPCA12P	RDBMS Lab	5	3	40	60	100	2
	IDC	22OPCAID1	Front End Web Development	2	3	25	75	100	2
II	Core	22OPCA21	Open Source Technology	5	3	25	75	100	4
	Core	22OPCA22	Advanced Java Programming	5	3	25	75	100	4
	Core	22OPCA23	Software Engineering	4	3	25	75	100	4
			DSEC - II	5	3	25	75	100	4
	Core	22OPCA21P	Open Source Technology Lab	5	3	40	60	100	2
	Core	22OPCA22P	Advanced Java Programming Lab	5	3	40	60	100	2
	IDC	22OPCAID2	E-Commerce	2	3	25	75	100	2
III	Core	22OPCA31	Web Technologies	5	3	25	75	100	4
	Core	22OPCA32	Python Programming	5	3	25	75	100	4
	Core	22OPCA33	Data Communications and Networking	4	3	25	75	100	4
			DSEC - III	5	3	25	75	100	4

	Core	22OPCA31P	Web Technologies Lab	5	3	40	60	100	2
	Core	22OPCA32P	Python Programming Lab	5	3	40	60	100	2
	Core	22OPCA41	Big Data Analytics	4	3	25	75	100	4

IV	Core	22OPCA42	Mobile Computing	5	3	25	75	100	4
			DSEC - IV	5	3	25	75	100	4
	Core	22OPCA41P	Dot Net Programming Lab	5	3	40	60	100	2
	Core	22OPCA42P	Networking Lab	5	3	40	60	100	2
	Project	22OPCAPR4	Project - Viva Voce			20	80	100	6
Total				120					90

DSEC – Discipline Specific Course

IDC - Inter Disciplinary Course

DSEC: Discipline Specific Elective Courses:

Semester I

DSEC – I (Choose any One)

- | | | |
|---------------------------------|---|-------------|
| 1. Operating Systems | - | 22OPCADSE1A |
| 2. Enterprise Resource Planning | - | 22OPCADSE1B |

Semester II

DSEC –II (Choose any One)

- | | | |
|-------------------------------------|---|-------------|
| 1. Data Mining and Data Warehousing | - | 22OPCADSE2A |
| 2. Artificial Intelligence | - | 22OPCADSE2B |

Semester III

DSEC – III (Choose any One)

- | | | |
|--------------------------------------|---|-------------|
| 1. Cryptography and Network Security | - | 22OPCADSE3A |
| 2. Internet Of Things | - | 22OPCADSE3B |

Semester IV

DSEC – IV (Choose any One)

- | | | |
|---------------------|---|-------------|
| 1. Machine Learning | - | 22OPCADSE4A |
| 2. Cloud Computing | - | 22OPCADSE4B |

Department of Computer Applications				Class: I MCA				
Sem	Category	Course Code	Course Title	Credits	Hrs	CIA	External Exam	Total
I	Elective	22OPCADSE1A	Operating Systems	4	5	25	75	100

Nature of the course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		

Course Objectives:

1. To be aware of the evolution and fundamental principles of Operating System.
2. To understanding the various Operating System components such as Process management and scheduling.
3. To solve the principles of concurrency scheduling algorithms and deadlocks.
4. To move process around in memory without it affecting its execution.
5. To provide the process of manipulating files in operating system.

Course Content :

Unit	Course Contents	Hours	K –Level	CLO
I	Introduction: What Operating Systems Do – Computer System Organization -Computer System Architecture – Operating System Structure – Operating System Operations – Open Source Operating Systems – Operating System Structures: Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs.	15	Up to K4	CLO1
II	Processes Management: Process Concept – Process Scheduling – Operation on Process. Process Scheduling: Basic Concepts - Scheduling Criteria – Scheduling Algorithms - Thread Scheduling- Multiple Processors Scheduling	15	Up to K4	CLO2
III	Synchronization: Background - The Critical Section Problem - Peterson's Solution –Synchronization Hardware – Semaphores – Classic Problems – Monitors –Synchronization Examples- Deadlocks: System Model -Deadlock Characterization -Methods for Handling Deadlocks- Deadlock Prevention-Deadlock Avoidance-Deadlock Detection-Recovery from Deadlock.	15	Up to K4	CLO3
IV	Main Memory: Background- Swapping- Contiguous Memory allocation - Segmentation - Paging-Structure of the Page Table- Virtual Memory : Background –Demand Paging-Copy on Write – Page Replacement - Allocation of Frames - Thrashing	15	Up to K5	CLO4
V	File System : File concepts – Access methods – File System Implementation : File System Structure – Allocation Methods - Free Space Management - Mass-Storage Structure : Overview of Mass Storage Structure – Disk Structure – Disk Scheduling – Disk Management – Swap Space Management.	15	Up to K5	CLO5

Book for Study:-

Abraham Silberchatz, Peter B Galvin, Gerg Gagne, “*Operating System Concepts*”, Wiley Publication, 9th Edition, 2018.

Chapters:

Unit – I	: Chapter 1 and 2	: 1.1-1.5, 1.12 and 2.1-2.5
Unit – II	: Chapter 3 and 5	: 3.1-3.3 and 5.1-5.5
Unit – III	: Chapter 6 and 7	: 6.1-6.9 and 7.1-7.7
Unit – IV	: Chapter 8 and 9	: 8.1 to 8.6 and 9.1-9.6
Unit – V	: Chapter 10, 11 and 12	: 10.1, 10.2, 11.1, 11.4, 11.5, 12.1-12.3, 12.4, 12.5

Book for 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, 7th Edition, 2011.
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, 7th Edition

Web Resources:

1. <http://www2.cs.uic.edu/~jbell/CourseNotes/OperatingSystems>
2. <http://Williamstallings.com/os/animations>
3. https://www.tutorial.com/operating_system/

e-Books:

1. https://drive.google.com/file/d/1FjqPaNAf8iqN_K8I3E0qcCjik8AnYe2i/view?usp=sharing
2. <https://drive.google.com/file/d/1t-peoj76iINep8oMiwdamq47f7yMVNRx/view?usp=sharing>
3. <https://drive.google.com/file/d/1qN2CUt6fWrFZq4Z2jvfnLivMkFHP1WuG/view?usp=sharig>

Pedagogy :

Chalk and Talk, Student Seminar, Assignment, Spot Test, Quiz, Group Discussion, PPT.

Rationale for Nature of the course:

An operating system is a software which learn all the basic tasks like file management, memory management, storage management, process management, handling input and output, and controlling peripheral devices.

Activities to be Given :

- Group Discussion
- Seminar
- Quiz

Course Learning Outcomes(CLO):

On the successful completion of the course. Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Remembering the basic concepts of computers and operating system	Up to K4
CLO2	Understand the operating system process management and scheduling algorithm	Up to K4
CLO3	Learning the synchronization and deadlock concepts	Up to K4
CLO4	Identifying the memory management and virtual memory management	Up to K5
CLO5	Analyzing the concept of storage management	Up to K5

K1- Remembering and recalling facts with specific answers

K2 - Basic understanding of facts and stating main ideas with general answers

K3- Learning and Problem solving

K4- Examining, Understanding, solving, analyzing and make interference with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1.Basic Level

2. Intermediate Level

3. Advanced Level

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	<ul style="list-style-type: none"> What Operating Systems Do – Computer System Organization -Computer System Architecture 	5	15	Chalk and Talk, Quiz,
	<ul style="list-style-type: none"> Operating System Structure – Operating System Operation–Open Source Operating Systems 	5		Chalk and Talk
	<ul style="list-style-type: none"> Operating System Services – User Operating System Interface-System Calls. Types of System Calls – System Programs. 	5		Chalk and Talk, Group Discussion
II	<ul style="list-style-type: none"> Processes Management: Process Concept – Process Scheduling – Operation on Process. 	5	15	Chalk and Talk, Group Discussion,
	<ul style="list-style-type: none"> Process Scheduling: Basic Concepts - Scheduling Criteria – Scheduling Algorithms 	5		Chalk and Talk
	<ul style="list-style-type: none"> Thread Scheduling-Multiple Processors Scheduling. 	5		Chalk and Talk
III	<ul style="list-style-type: none"> Synchronization: Background - The Critical Section Problem - Peterson's Solution – Synchronization Hardware 	5	15	Chalk and Talk, Seminar
	<ul style="list-style-type: none"> Semaphores – Classic Problems – Monitors – Synchronization Examples-Deadlocks: System Model -Deadlock Characterization. 	5		Chalk and Talk,
	<ul style="list-style-type: none"> Methods for Handling Deadlocks- Deadlock Prevention-Deadlock Avoidance- Deadlock Detection-Recovery from Deadlock. 	5		PowerPoint Presentation Quiz Chalk and Talk,

IV	<ul style="list-style-type: none"> • Main Memory: Background- Swapping- Contiguous Memory allocation - Segmentation • Paging-Structure of the Page Table- Virtual Memory : Background –Demand Paging • Copy on Write – Page Replacement - Allocation of Frames - Thrashing. 	5 5 5	15	Chalk and Talk, quiz Chalk and Talk, Chalk and Talk, PowerPoint Presentation
V	<ul style="list-style-type: none"> • File System : File concepts – Access methods – File System Implementation : File System Structure • Allocation Methods - Free Space Management - Mass-Storage Structure : Overview of Mass Storage Structure • Disk Structure – Disk Scheduling – Disk Management – Swap Space Management. 	5 5 5	15	Chalk and Talk, quiz Chalk and Talk, Seminar Chalk and Talk PowerPoint Presentation Assignment

Course Designer
Mrs.P.Indhuja

Department of Computer Applications				Class : I M.C.A				
Sem.	Category	Course Code	Course Title	Credits	Hrs.	CIA	External Exam	Total
I	Elective	22OPCADSE1B	Enterprise Resource Planning	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	√

Course Objectives:

1. The core of ERP is to planning for justifying ERP investments and to explain the benefits of ERP
2. To learn the fundamental ERP and its Related technologies to building excellent software domain
3. To practice the implementation life cycle to build transaction and package selection.
4. To execute the team members, consultants and to predicts success and failure implementation of ERP
5. To apply the ERP domain in present and future enhancements.

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	Introduction : Introduction: Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments - Benefits of ERP.	15	Up to K4	CLO1
II	ERP and Related Technologies: ERP and Related Technologies - Advanced technology and ERP Security. ERP Marketplace and Functional Modules: ERP Marketplace and Marketplace Dynamics – Business Modules of an ERP Package.	15	Up to K4	CLO2
III	ERP Implementation: ERP Implementation Lifecycle - ERP Package Selection – ERP Transition Strategies .	15	Up to K4	CLO3
IV	ERP Implementation: ERP Implementation	15	Up to K5	CLO4

	Process –ERP Project Teams – Consultants, Vendors and Employees – Success and Failure factors of the ERP Implementation			
V	ERP – Present and Future: ERP and E-Business – ERP, The Internet, and WWW-ERP II – Future Directions and Trends in ERP	15	Up to K5	CLO5

Book for Study :

Alexis Leon, ERP Demystified , Tata Mc-Graw Hill , 3rd Edition , 2014.

Chapters:

Unit - I	: 3, 4, 5, 7
Unit - II	: 8, 9, 10, 11
Unit - III	: 13, 14, 15
Unit - IV	: 17, 18, 19, 20
Unit - V	: 23, 24, 25

Books for Reference :

1. Joseph Brady A., Ellen Monk F., Bret Wagner, *Concepts in Enterprise Resource Planning* , Thompson Course Technology , 1st Edition , 2001.
2. Vinod Kumar Garg and Venkitakrishnan N K, *Enterprise Resource Planning – Concepts and Practice* , PHI , 2nd Edition , 2003
3. Mary Sumner , *Enterprise Resource Planning* , Pearson Education , 9th Edition , 2012
4. Alexis Leon , *Enterprise Resource Planning* , Mc-Graw Hill Education , 2nd Edition , 2014.
5. Jaiswal , *Textbook of Enterprise Resource Planning* , Macmillan Publishers , 1st Edition , 2005.

Web Resources :

1. <http://projanco.com/Library/Enhancing%20enterprise%20intelligence%20-leveraging%20ERP,%20CRM,%20SCM,%20PLM,%20BPM,%20and%20BI.pdf>
2. <https://www.qad.com/what-is-erp>
3. https://www.tutorialspoint.com/sap/sap_introduction.htm

e-books:

1. <https://cs.calvin.edu/courses/cs/344/kvlinden/resources/AIMA-3rd-edition.pdf>
2. <https://www.cin.ufpe.br/~tf12/artificial-intelligence-modern-approach.9780131038059.25368.pdf>
3. <https://www.oracle.com/webfolder/assets/ebook/complete-guide-to-modern-erp/pdf/modern-erp.pdf>

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Assignments , Quiz

Rationale for Nature of the Course :

The practical application packages of ERP is to the create design and building of ERP domain.

Activities on Knowledge and Skill

- Practice to code programs
- Group Discussion
- Seminar

Course Learning Outcomes(CLO):

On Successful Completion of the course students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand to Examine the Basic Concept of contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology	Up to K4
CLO2	Identify how ERP is secure the data and to expand the market places	Up to K4
CLO3	Apply the ERP package software for various transition strategies	Up to K4
CLO4	Apply Knowledge to Construct implementation life cycle of ERP and select best ERP vendors and Consultants	Up to K5
CLO5	Explore the present and future trends for ERP business	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level

2 – Intermediate Level

3- Advanced Level

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	<ul style="list-style-type: none"> ▪ Introduction: Introduction to ERP ▪ Basic ERP Concepts – ▪ Justifying ERP Investments ▪ Benefits of ERP. 	4 3 3 5	15	Chalk & Talk, Spot Test Chalk & Talk Chalk & Talk,
II	<ul style="list-style-type: none"> ▪ ERP and Related Technologies: ERP and Related Technologies – ▪ Advanced technology and ERP Security. ▪ ERP Marketplace and Functional Modules: ERP Marketplace and Marketplace Dynamics ▪ Business Modules of an ERP Package. 	4 4 3	15	Chalk & Talk, Spot Test Chalk & Talk Chalk & Talk Chalk & Talk Group Discussion ,
III	<ul style="list-style-type: none"> ▪ ERP Implementation: ERP Implementation Lifecycle ▪ ERP Package Selection ▪ ERP Transition Strategies 	5 5 5	15	Chalk & Talk, Spot Test Chalk & Talk , PowerPoint Presentation Chalk & Talk , Group Discussion ,
IV	<ul style="list-style-type: none"> ▪ ERP Implementation: ERP Implementation Process ,ERP Project Teams ▪ Consultants, Vendors and Employees ▪ Success and Failure factors of the ERP Implementation 	5 5 5	15	Chalk & Talk, Spot Test Chalk & Talk, PowerPoint Presentation Chalk & Talk,
V	<ul style="list-style-type: none"> ▪ ERP – Present and Future: ERP and E-Business ▪ ERP, The Internet, and WWW, ERP II ▪ Future Directions and Trends in ERP 	5 5 5	15	Chalk & Talk, Spot Test Chalk & Talk, PowerPoint Presentation Chalk & Talk

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IV	<ul style="list-style-type: none"> • Software Testing Strategies: A Strategic Approach To Software Testing – Strategic Issues - Test Strategies For Conventional Software – • Test Strategies for Object-Oriented Software –Test Strategies for Web Apps - Validation Testing - System Testing • Testing Conventional Applications: Software Testing Fundamentals - Internal and External Views of Testing ▪ White Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing – Model Based Testing. 	3	12	Chalk & Talk, Spot Test
		3		PowerPoint Presentation
		3		Chalk & Talk,
		3		PowerPoint Presentation
V	<ul style="list-style-type: none"> • Quality Concepts- What is Quality – Software Quality • Software Quality Assurance – Background Issues – Elements of Software Quality Assurance - SQA Tasks , Goals and Metrics - Formal Approach To SQA - Statistical Software Quality Assurance – Software Reliability • Software Configuration Management - Software Configuration Management- The SCM Repository - The SCM Process. 	4	12	Chalk & Talk, Spot Test
		4		PowerPoint Presentation
		4		Chalk & Talk

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Department of Computer Applications				Class : I M.C.A				
Sem.	Category	Course Code	Course Title	Credits	Hrs	CIA	External Exam	Total
II	Elective	22OPCADSE2A	Data Mining and Data Warehousing	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		

Course Objectives:

1. To acquire knowledge about Data Mining and warehousing,
2. To study the various steps in data pre-processing and Association mining.
3. To understand the basic and advanced concept of Classification technique.
4. To learn the different methods of Clustering.
- 5., To analyse the data mining trends and various application of data mining.

Course Content :

Unit	Course Contents	Hours	K Level	CLO
I	Introduction : Why Data Mining? - What is Data Mining? – What kinds of data can be mined? - What kinds of patterns can be mined? - Which technologies are used? –Which kinds of Applications are targeted? - Major issues in Data Mining . Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts - Data Warehouse Modeling: Data Cube and OLAP – Data Warehouse Design and Usage - Data Warehouse Implementation .	15	Up to K4	CLO1
II	Data Preprocessing – Data Preprocessing: An overview - Data Cleaning - Data Integration - Data Reduction - Data Transformation and Data Discretization. Mining frequent patterns, associations and Correlations: Basic Concepts and Methods Basic Concepts-Frequent itemset Mining Methods.	15	Up to K4	CLO2
III	Classification: Basic Concepts: Basic Concepts - Decision Tree Induction – Bayes Classification Methods – Rule-Based Classification. Classification: Advanced Methods: Bayesian Belief Networks-Classification by Back propagation – Support Vector Machines – Lazy Learners- Other Classification Methods.	15	Up to K4	CLO3
IV	Cluster Analysis: Basic Concepts and Methods: Cluster Analysis-Partitioning Methods –Hierarchical Methods – Density-Based Methods- Grid-Based Methods. Advanced Cluster Analysis: Probabilistic Model-Based Clustering - Clustering High-Dimensional Data- Clustering Graph and Network Data – Clustering with Constraints.	15	Up to K5	CLO4
V	Outlier Detection: Outliers and Outlier Analysis – Outlier Detection Methods. Data Mining Trends and Research Frontiers: Mining Complex Data Types- Other Methodologies of Data Mining-Data Mining Applications- Data Mining and Society- Data Mining Trends.	15	Up to K5	CLO5

Book for Study:

Jiawei Han and Micheline Kamber , Jian Pei , *Data Mining Concepts and Techniques* , Elsevier Publisher , 3rd Edition , 2011.

Chapters:

- Unit - I** : 1.1 to 1.7, 4.1 to 4.4
Unit - II : 3.1 to 3.5, 6.1, 6.2
Unit - III : 8.1 to 8.4, 9.1 to 9.3, 9.5, 9.6
Unit - IV : 10.1 to 10.5, 11.1 to 11.4
Unit - V : 12.1, 12.2, 13.1 to 13.5

Books for Reference:

1. S.Nagabhushana , *Data Warehousing OLAP and Data Mining* , New Age International Publishers , 1st Edition , 2006
2. Pieter Adriaans , Dolf Zantinge , *Data Mining* , Pearson Education , 1st Edition , 2007.
3. Arun K.Pujari, *Data Mining Techniques* , Universities press, 3rd Edition , 2013.
4. S.K. Mourya, Shalu Gupta, *Data Mining and Data warehousing* , Narosa Publishing House Private Ltd , 1st Edition , 2013.
5. Bharat Bhushan Agarwal , Sumit Prakash Tayal , *Data Mining and Data Warehousing* , University Science Press , 1st Edition , 2009.

Web Resources :

1. <https://tinyurl.com/7x37fesh>
2. <https://www.academia.edu>
3. <http://infolab.stanford.edu>

e-Books:

1. https://drive.google.com/file/d/11niDmYcpF_C44RCG9bmsH3Mndk47uINl/view?usp=sharing
2. <https://drive.google.com/file/d/1fYSW-ft3Mj24bvMnf4RxPYpvxLRyV2o/view?usp=sharing>
3. <https://drive.google.com/file/d/1cSVCjZxJI7AFDFsKDVIZHoQDGoVV5nxi/view?usp=sharing>

Pedagogy:

Chalk and Talk, Group Discussion, Student Seminar, Spot Test, Quiz and Assignments

Rationale for Nature of the Course :

The data preprocessing methods and techniques and applications of data mining are widely used in real time

Activities to be given :

- Group Discussion
- Seminar

Course Learning Outcomes (CLOs):

On Successful completion of the course, the learners should be able to

CLOs	Course Learning Outcomes	Knowledge Level(According to Bloom's Taxonomy)
CLO1	Understand the basic concepts of Data mining and Data Warehouse	Up to K4
CLO2	Classify the various methods of data preprocessing and frequent itemset mining	Up to K4
CLO3	Apply the Basic and Advanced methods in classification	Up to K4
CLO4	Make use of various methods of Clustering	Up to K5
CLO5	Examine the various types of Outlier Detection and Data Mining Applications	Up to K5

K1- Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – solving problems

K4- Examining, analyzing, presentation and make inference with evidences.

K5 – Evaluate , making Judgments based on criteria

Course Learning Outcomes:**Mapping of Course Outcomes(CLOs) with Program Outcomes(POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	2	2	1	1
CLO2	3	2	2	3	2	1
CLO3	3	2	3	3	3	3
CLO4	3	3	3	3	3	3
CLO5	3	3	3	3	3	3

1. Basic level

2. Intermediate level

3. Advanced level

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	<ul style="list-style-type: none"> Why Data Mining,- What is Data Mining, What kinds of data can be mined, What kinds of patterns can be mined 	4	15	Chalk and Talk
	<ul style="list-style-type: none"> Which technologies are used, Which kinds of Applications are targeted, Major issues in Data Mining. 	4		Chalk and Talk
	<ul style="list-style-type: none"> Data Warehouse: Basic Concepts, ,Data Warehouse Modeling : Data Cube and OLAP – Data Warehouse Design and Usage - Data Warehouse Implementation. 	4		Chalk and Talk
	<ul style="list-style-type: none"> Data Warehouse Design and Usage - Data Warehouse Implementation 	3		Chalk and Talk
II	<ul style="list-style-type: none"> Data Preprocessing: An overview - Data Cleaning 	4	15	Chalk and Talk
	<ul style="list-style-type: none"> Data Integration - Data Reduction 	4		PPT
	<ul style="list-style-type: none"> Data Transformation and Data Discretization 	4		Chalk and Talk
	<ul style="list-style-type: none"> Basic Concepts-Frequent itemset Mining Methods. 	3		PPT
III	<ul style="list-style-type: none"> Basic Concepts ,Decision Tree Induction, Bayes Classification Methods , Rule-Based Classification. 	4	15	Chalk and Talk
	<ul style="list-style-type: none"> Bayesian Belief Networks, Classification by Back propagation 	4		Chalk and Talk
	<ul style="list-style-type: none"> Support Vector Machines ,Lazy Learners, Other Classification Methods. 	3		Chalk and Talk
	<ul style="list-style-type: none"> Clustering Graph and Network Data, Clustering with Constraints. 	4		PPT
IV	<ul style="list-style-type: none"> Cluster Analysis, Partitioning Methods ,Hierarchical Methods , Density-Based Methods, Grid-Based Methods 	5	15	Chalk and Talk
	<ul style="list-style-type: none"> Probabilistic Model-Based Clustering , Clustering High-Dimensional Data 	5		Chalk & Talk, Assignment
	<ul style="list-style-type: none"> Clustering Graph and Network Data , Clustering with Constraints. 	5		Chalk and Talk & Group Discussion

V	• Outliers and Outlier Analysis ,Outlier Detection Methods.	5	15	PPT
	• Mining Complex Data Types, Other Methodologies of Data Mining	5		Chalk and Talk
	• Data Mining Applications, Data Mining and Society, Data Mining Trends	5		PPT

Course Designer
Dr.(Mrs.)S.Vijayasankari

Department of Computer Applications				Class : I M.C.A				
Sem.	Category	Course Code	Course Title	Credits	Hrs.	CIA	External Exam	Total
II	Elective	22OPCADSE2B	Artificial Intelligence	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		√

Course Objectives:

- 1) To enable computers to perform such intellectual tasks as decision making, problem solving, perception, understanding human communication .
- 2) Artificial intelligence shapes the future of every company.
- 3) Artificial intelligence creates synergy between humans and AI
- 4) Artificial intelligence helps with planning
- 5) Artificial intelligence performs more complex tasks

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	Artificial Intelligence: What is Artificial Intelligence - The AI Problems - The Underlying Assumption - What is an AI Technique - Criteria for Success . Problems - Problem Spaces and Search : Defining the Problem as a State Space Search - Production Systems – Problem Characteristics - Production System Characteristics - Issues in the Design of Search Programs.	15	Up to K4	CLO1
II	Heuristic Search Techniques: Generate and Test - Hill Climbing - Best First Search – Problem Reduction - Constraint Satisfaction - Means Ends Analysis. Knowledge Representation Issues : Representations and Mapping - Approaches to Knowledge Representation - Issues in Knowledge Representation - The Frame Problem	15	Up to K4	CLO2
III	Using Predicate Logic: Representing Simple Facts in Logic - Representing Instance and Isa Relationships - Computable Functions and Predicates – Resolution - Natural Deduction. Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge - Logic Programming - Forward Versus Backward Reasoning – Matching - Control Knowledge.	15	Up to K4	CLO3
IV	Statistical Reasoning: Probability and Bayes' Theorem - Bayesian Networks - Fuzzy Logic. Game Playing: Overview - The Minimax Search Procedure - Adding Alpha-beta CutOffs - Iterative Deepening.	15	Up to K5	CLO4

V	Natural Language Processing: Introduction - Syntactic Processing - Semantic Analysis. Expert Systems: Representing and Using Domain Knowledge - Expert System Shells – Explanation - Knowledge Acquisition.	15	Up to K5	CLO5
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Book for Study :

Elaine Rich , Kevin Knight and Shivashanker B Nair , *Artificial Intelligence* , McGraw Hill , 3rd Edition , 2010

Chapters:

- Unit - I** : 1(1.1 – 1.3 , 1.5) , 2(2.1-2.5)
Unit - II : 3(3.1-3.6) , 4(4.1-4.4)
Unit - III : 5(5.1 – 5.5) , 6(6.1-6.5)
Unit - IV : 8(8.1,8.3,8.5) , 12(12.1-12.3 , 12.5)
Unit - V : 15(15.1 – 15.3) , 20(20.1 -20.4)

Books for Reference :

1. Kaushik , *Artificial Intelligence* , Cengage Publisher , 1st Edition , 2011.
2. Dr.Dheeraj Mehrotra , *Basics Of Artificial Intelligence & Machine Learning* , Notion Press; 1st Edition 2019
3. Stuart Russell , *Artificial Intelligence:A Modern Approach* , Pearson Education , 3rd Edition, 2013.
4. Jatinder Singh , Amardeep Singh , Gurjeet Singh , *A Text book of Artificial Intelligence* ,VDH Publisher , 1st Edition , 2012.
5. Deepak Khemani , *A first Course in Artificial Intelligence* , McGraw Hill Education , 3rd Edition , 2013.

Web Resources :

- 1.<https://www.javatpoint.com/artificial-intelligence-tutorial>
- 2.http://zsi.tech.us.edu.pl/~nowak/bien/BIEN_introduction
- 3.<https://www.guru99.com/artificial-intelligence-tutorial.html>

e-books:

1. <https://cs.calvin.edu/courses/cs/344/kvlinden/resources/AIMA-3rd-edition.pdf>
2. <https://www.cin.ufpe.br/~tfl2/artificial-intelligence-modern-approach.9780131038059.25368.pdf>
- 3.<http://www.freebookcentre.net/ComputerScience-Books-Download/Artificial-Intelligence-Lecture-Notes-Veer-Surendra-Sai-University.html>

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Assignments , Quiz

Rationale for Nature of the Course :

Studying artificial intelligence opens a world of opportunities. At a basic level, its better to understand the systems and tools that we interact with on a daily basis. In the field of artificial intelligence, the possibilities are truly endless.

Activities on Knowledge and Skill

- Group Discussion
- Seminar

Course Learning Outcomes(CLO):

On Successful Completion of the course students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand the importance, the basic concepts and the Applications of AI	Up to K4
CLO2	Apply various search techniques used for Intelligent systems	Up to K4
CLO3	Efficiently represent the various knowledge representation schemes used for intelligent systems.	Up to K4
CLO4	Apply some statistical like Bayes Theorem and Soft computing techniques (like ANN and GA) to solve the AI problem.	Up to K5
CLO5	Understand the phases and the architecture of various advanced system like NLP based system and Expert System.	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level

2 – Intermediate Level

3- Advanced Level

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	<ul style="list-style-type: none"> ▪ Artificial Intelligence: What is Artificial Intelligence - The AI Problems - The Underlying Assumption - What is an AI Technique - Criteria for Success . 	5		Chalk & Talk, Spot Test
	<ul style="list-style-type: none"> ▪ Problems - Problem Spaces and Search : Defining the Problem as a State Space Search - Production Systems 	5	15	Chalk & Talk
	<ul style="list-style-type: none"> ▪ Problem Characteristics - Production System Characteristics - Issues in the Design of Search Programs. 	5		Chalk & Talk , Group Discussion ,
II	<ul style="list-style-type: none"> ▪ Heuristic Search Techniques: Generate and Test - Hill Climbing - Best First Search - Problem Reduction - Constraint Satisfaction - Means Ends Analysis . 	5		Chalk & Talk, Spot Test
	<ul style="list-style-type: none"> ▪ Knowledge Representation Issues : Representations and Mapping – 	5	15	Chalk & Talk
	<ul style="list-style-type: none"> ▪ Approaches to Knowledge Representation - Issues in Knowledge Representation - The Frame Problem 	5		Chalk & Talk , Group Discussion ,
III	<ul style="list-style-type: none"> ▪ Using Predicate Logic: Representing Simple Facts in Logic - Representing Instance and Isa Relationships - Computable Functions and Predicates – Resolution - Natural Deduction. 	5		Chalk & Talk, Spot Test
	<ul style="list-style-type: none"> ▪ Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge - 	5	15	Chalk & Talk

	Logic Programming ▪ Forward Versus Backward Reasoning – Matching - Control Knowledge.	5		PowerPoint Presentation , Group Discussion ,
IV	▪ Statistical Reasoning: Probability and Bayes' Theorem - Bayesian Networks - Fuzzy Logic.	5	15	Chalk & Talk, Spot Test
	▪ Game Playing: Overview - The Minimax Search Procedure	5		PowerPoint Presentation
	▪ Adding Alpha-beta CutOffs - Iterative Deepening.	5		Chalk & Talk,
V	▪ Natural Language Processing: Introduction - Syntactic Processing - Semantic Analysis.	5	15	Chalk & Talk, Spot Test
	▪ Expert Systems: Representing and Using Domain Knowledge	5		PowerPoint Presentation
	▪ Expert System Shells – Explanation - Knowledge Acquisition.	5		Chalk & Talk

Course Designer
Mrs.M.Murugeswari