Learning Outcomes based Curriculum Framework (LOCF)

for

Master of Computer Applications (MCA) (Duration 2 Years)

(w.e.f. 2022-23)



Department of Computer Science and Information Technology School of Technology MAULANA AZAD NATIONAL URDU UNIVERSITY

1. Vision and Mission

1.1 Vision

To meet the requirements of the society by imparting knowledge, ethics and moral values with a holistic approach.

1.2 Mission

To impart quality education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens embedded with ethical values.

1.3 Strategies for Attaining the Vision and Fulfilling the Mission

Following strategies will be used to ensure the accomplishment of the stated vision and mission:

- 1. To create an ambiance for healthy teaching-learning process and attract the motivated students to the Department of Computer Science and Information Technology
- 2. Ensure that the curriculum followed is comparable to the relevance of local, national, regional and global development
- 3. To motivate the potential faculty members/ educators who are constantly upgrading their pedagogical approaches to motivate students and to enhance learning among them
- 4. Provide opportunities to students for global exposure, industrial internships, project based and research-based learning

2. Program Educational Objectives

Program Educational Objectives (PEOs) are broad statements that describe the career and professional accomplishments that CS&IT Department is preparing its graduates to achieve during the graduation. Following four PEOs are defined as:

PEO 1. To train the graduates to acquire in depth knowledge of fundamental concepts and programming skills for holistic development.

PEO 2. To prepare the graduates for productive careers in software industry, corporate sector, Government Organizations.

PEO 3. To prepare graduates to acquire excellent computing ability so that they can analyze, design and create Solutions for real time problems.

PEO 4. To apply the current tools and techniques to create systems for solving Industry oriented problems.

3. Program Outcomes (POs)

Program outcomes are the narrower statements that describe what students are expected to know and be able to do upon graduation. POs represent the knowledge, skills and attitudes the students should have at the end of a program. Following are the statements for POs for computer application program. At the time of completing their degree requirements, students will be able to:

- **PO₁:** Apply the knowledge of Mathematics, Science, and Engineering fundamentals, and an engineering specialization to solution of complex engineering problems **(Engineering Knowledge)**.
- **PO₂:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (**Problem analysis**).
- **PO**₃: Design of solutions for complex engineering problems and design of system components or processes that meet the specified needs with appropriate considerations of public health and safety, and cultural, societal, and environmental considerations (**Design/development of solutions**).
- **PO**₄: Use research-based methods including design of experiments, analysis and interpretation of data and synthesis of information leading to logical conclusions (**Conduct investigations of complex problems**).
- **PO**₅: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling complex engineering activities with an understanding of limitations (**Modern tool usage**).
- **PO**₆: Apply reasoning within the contextual knowledge to access societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice (**The engineer and society**).
- **PO**₇: Understand the impact of the professional engineering solutions in the societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable developments (Environment and sustainability).
- **PO**₈: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice (**Ethics**).
- **PO**₉: Function effectively as an individual independently and as a member or leader in diverse teams, and in multidisciplinary settings (**Individual and team work**).
- **PO**₁₀: Communicate effectively on complex engineering activities with the engineering community and with society at large such as being able to comprehend and write effective reports and design documentation, make effective oral presentations, and give and receive clear instructions (**Communication**).
- **PO₁₁:** Demonstrate knowledge and understanding of engineering management principles and apply those to one's own work as a member and leader of a team to manage projects in multidisciplinary environments (**Project management and finance**).
- **PO**₁₂: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change (**Life-long Learning**).

4. Program Specific Outcomes (PSOs)

Program Specific Outcomes (PSOs) are the statements that define outcomes of a program which make students realize the fact that knowledge and techniques learnt in a specific course has direct implication for the betterment of society and its sustainability.

- **PSO 1:** The ability to design and develop applications using the knowledge of Mathematics, Science and Engineering fundamentals.
- **PSO 2:** Ability to test and analyze the quality of developed applications and to integrate them in order to evolve a larger computing system.
- **PSO 3:** Apply appropriate techniques, resources, and modern engineering and IT tools to address societal, health, safety, legal, and cultural issues.
- **PSO 4:** To analyze and assess various functional and technical security challenges in protecting various digital assets and infrastructure in the internet era and to design and develop innovative technological solutions for the same

PSOs have to be attained by the students in due course of the two years program either as part of their Core, Discipline Specific Electives, Tools and techniques or as part of their various levels of seminar/ internship and project work.

5. Mapping between PEOs, POs and PSOs

The following Table lists the relationships between the PEOs, POs. and PSOs. The attainment of POs can be viewed as a strategy for attaining the PEOs. Each PEO is supported by multiple POs to ensure strength in compliance. Also, the relationship between individual PO and PEOs can vary between **Reasonable (1)** and **Strong (3)**.

DEOr		POs											PSOs			
PEOs	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
PEO1	2	3	1	3	1	2	1	1	1	2	1	2	2	1	1	2
PEO2	1	1	2	1	3	1	2	1	2	1	2	1	1	2	3	1
PEO3	2	2	3	3	2	2	1	2	1	2	1	3	2	1	2	1
PEO4	2	2	2	3	3	2	1	1	3	2	1	2	1	2	1	3

1 - Reasonable

2 - Significant

3 - Strong

6. Course Outcomes (COs)

Course Outcomes are narrower statements that describe what students are expected to know and be able to do at the end of the course. Course outcomes are defined for all courses as part of the syllabus for the course and are measured through performance on assignments, written and oral presentation reports related to individual and team projects and through the mid-term and semester end examinations. Detailed syllabi for each course associated with Course Objectives and Course Outcomes has been for specific outcomes associated with the course. Attaining the COs is at the heart of the educational activity. If COs of individual courses are successfully attained and the curriculum has been designed to achieve the Program Outcomes, then attainment of the POs is also ensured. An effective Assessment Plan has been devised to meet the objective, quantitative and independent measures to demonstrate that all POs and PEOs are being attained by the program.

7. Continuous Quality Improvement and Assessment Plan

The purpose of the Assessment Plan is to ensure attainment of all Program Outcomes (POs) and also the attainment of the Program Educational Objectives (PEOs) and to independently confirm that the POs and PEOs are being attained. Periodic monitoring of progress allows faculty members and the leadership to take corrective actions where the POs and PEOs are not meeting established targets. The process consists of assessing and evaluating the extent to which the student outcomes are being attained. The results of these assessments and evaluations are subsequently used as the primary inputs for making improvements to the program.

MAULANA AZAD NATIONAL URDU UNIVERSITY SCHOOL OF TECHNOLOGY DEPARTMENT OF COMPUTER SCIENCE & IT

Master of Computer Applications (MCA)

General, Course structure & Theme & Semester-wise credit distribution

A. Definition of C	A. Definition of Credit:									
1	1 Hr. Lecture (L) per week	1 credit								
2	1 Hr. Tutorial (T) per week	1 credit								
3	2 Hours Practical (Lab)/week	1 credit								

B. Range of credits:

A student requires to complete total 88 credits to be eligible to get Post Graduate degree in Computer Applications.

C. Str	ucture of Post graduate Computer	Applications prog	gram:
S.	Course Type	Abbreviation	Credit Breakup
No.	Course Type	ADDIEVIALIOII	for MCA Students
1	Program Core Course	PCC	54
2	Discipline Specific Elective	DSE	9
3	Generic Elective	GE	4
	(Interdisciplinary)		
4	Foundation Course	FC	3
5	Ability Enhancement Course	AEC	2
6	Projects	PROJ	16
	Total		88

MAULANA AZAD NATIONAL URDU UNIVERSITY

DEPARTMENT OF CS&IT SCHEME OF INSTRUCTIONS, EXAMINATION & EVALUATION (Effective for Batch Admitted from 2022-23 Academic Year)

Master of Computer Applications (MCA)

Total Credits (2 Year Course): 88

I. INDUCTION	PROGRAM (PLEASE REFER APPENDIX-A FOR GUIDELINES)						
Induction Program	3 Weeks duration						
(mandatory)	(Please refer Appendix-A for guidelines & also details available in the						
	curriculum of Mandatory courses)						
Induction program for	Physical activity						
students to be offered right	Creative Arts						
at the start of the first year.	 Universal Human Values 						
	 Literary 						
	 Proficiency Modules 						
	 Lectures by Eminent People 						
 Visits to local Areas 							
	 Familiarization to Dept./Branch & Innovations 						

Schedule

The activities during the Induction Program would have an Initial Phase, a Regular Phase and a Closing Phase. The Initial and Closing Phases would be two days each.

Initial Phase	
Time	Activity
Day 0	
Whole day	Students arrive - Hostel allotment. (Preferably do pre-allotment)
Day 1	
09:00 am - 03:00 pm	Academic registration
04:30 pm - 06:00 pm	Orientation
Day 2	
09:00 am - 10:00 am	Diagnostic test (for English etc.)
10:15 am - 12:25 pm	Visit to respective depts.
12:30 pm - 01:55 pm	Lunch
02:00 pm - 02:55 pm	Director's address
03:00 pm - 05:00 pm	Interaction with parents
03:30 pm - 05:00 pm	Mentor-mentee groups - Introduction within group. (Same as Universal
	Human Values groups)
D 1 D1	

Regular Phase

After two days is the start of the Regular Phase of induction. With this phase there would be regular program to be followed every day.

3.2.1 Daily Schedule

Some of the activities are on a daily basis, while some others are at specified periods within the Induction Program. We first show a typical daily timetable.

7

Sessn.	Time	Activity	Remarks
Day 3 onwa	ards		
	06:00 am	Wake up call	
Ι	06:30 am - 07:10 am	Physical activity (mild exe	ercise/yoga)
	07:15 am - 08:55 am	Bath, Breakfast, etc.	
II	09:00 am - 10:55 am	Creative Arts / Universal	Human Values
		Half the groups d	o Creative Arts
III	11:00 am - 12:55 pm	Universal Human Values	/
		Creative Arts	Complementary alternate
	01:00 pm - 02:25 pm	Lunch	
IV	02:30 pm - 03:55 pm	Afternoon Session See be	elow.
V	04:00 pm - 05:00 pm	Afternoon Session See be	elow.
	05:00 pm - 05:25 pm	Break / light tea	
VI	05:30 pm - 06:45 pm	Games / Special Lecture	s
	06:50 pm - 08:25 pm	Rest and Dinner	
VII	08:30 pm - 09:25 pm	Informal interactions (in	hostels)

Sundays are off and Saturdays have the same schedule as above or have outings.

Afternoon Activities (Non-Daily)

The following five activities are scheduled at different times of the Induction Program, and are not held daily for everyone:

- 1. Familiarization to Dept./Branch & Innovations
- 2. Visits to Local Area
- 3. Lectures by Eminent People
- 4. Literary
- 5. Proficiency Modules

Here is the approximate activity schedule for the afternoons (may be changed to suit local needs):

Activity		Session	Remarks	
Familiarization with Dept/Bra	inch			
& Innovations	IV		For 3 days (Day 3 to 5)	
Visits to Local Area	IV, V an	d VI	for 3- days	
			For 3 days - interspersed (e.g., 3 Saturdays)	
Lectures by Eminent People	IV		As scheduled - 3-5 lectures	
Literary (Play / Book Reading	/ Lecture)	IV	For 3-5 days	
Proficiency Modules	V		Daily, but only for those who need it	
Closing Phase				
Time	Activity			
Last But One Day				
08:30 am - 12 noon	Discussions and	d finaliz	ation of presentation within each group	
02:00 am - 05:00 pm	Presentation by	v each g	roup in front of 4 other groups besides their	
	own (about 100	studen	ts)	
Last Day				
Whole day Examinations ((if any). May be e	xpande	d to last 2 days, in case needed.	

II. SEMESTER WISE STRUCTURE OF CURRICULUM

[L= Lecture, T= Tutorials, P=Practical, C= Credits]

PROGR	AM	YEAR				SEMESTER					
MCA	ł	I						Ι			
			Hours/Week				Sc	ore	n 1 n		
Course Code	Description	Course Title	L	Т	Р	Credits	Internal	External	End Exam Duration		
MMCA111FCT	FC	Statistical Analysis	3	1	0	3	30	70	3 Hrs.		
MMCA111PCT	PCC	Software Engineering	3	1	0	4	30	70	3 Hrs.		
MMCA112PCT	PCC	Computer Network	3	1	0	4	30	70	3 Hrs.		
MMCA113PCT	PCC	Operating Systems	3	1	0	4	30	70	3 Hrs.		
	GE	Generic Elective	3	1	0	4	30	70	3 Hrs.		
MMCA160AEP	AEC	English Language & Communication Lab	0	0	4	2	50	50	3 Hrs.		
	Total C	Credits per semester				21	60	00			
		latory Induction Prog ions of the subject(s) v	-								

Note: End Semester Examinations of the subject(s) weighted more than 2 credits will be for three Hrs. duration with maximum 100 marks score (30+70)

PROGR	RAM	YEAR				SEMESTER				
MCA	A	Ι	II							
			Ηοι	ırs/V	Week		Score		End	
Course Code	Description	Course Title	L	Т	Р	Credits	Internal	External	Exam Duration	
MMCA211PCT	PCC	Data Structure & Algorithms	3	1	0	4	30	70	3 Hrs.	
MMCA212PCT	PCC	Database Management System	3	1	0	4	30	70	3 Hrs.	
MMCA213PCT	PCC	Java Programming	3	1	0	4	30	70	3 Hrs.	
MMCA214PCT	PCC	Computer System Architecture	3	1	0	4	30	70	2 Hrs.	
MMCA211PET	DSE	DSE – 1	3	1	0	4	30	70	3 Hrs.	
MMCA260PCT	LAB	Data Structure & Algorithms Lab	0	0	4	2	50	50	3 Hrs.	

Syllabus & Curriculum MCA 2022-23

MMCA261PCP	LAB	Database Management System Lab	0	0	4	2	50	50	3 Hrs.
MMCA262PCP	LAB	Java Programming Lab	0	0	4	2	50	50	3 Hrs.
Total						25	80	00	

PROGR	AM	YEAR				SEMESTER				
MCA	ł	II						III		
			Ηοι	Hours/Week			Score		End	
Course Code	Description	Course Title	L	Т	Р	Credits	Internal	External	Exam Duration	
MMCA311PCT	PCC	Data Science	3	1	0	4	30	70	3 Hrs.	
MMCA312PCT	PCC	Formal Language & Automata Theory	3	1	0	4	30	70	3 Hrs.	
MMCA313PCT	PCC	Blockchain Technology	3	1	0	4	30	70	3 Hrs.	
MMCA314PCT	PCC	Machine Learning	3	1	0	4	30	70	3 Hrs.	
MMCA311PET	DSE	DSE – 2	3	1	0	3	30	70	2 Hrs.	
MMCA321PET	DSE	DSE – 3	3	1	0	3	30	70	3 Hrs.	
MMCA360PCP	LAB	Data Science Lab	0	0	4	2	50	50	3 Hrs.	
MMCA361PCP	LAB	Blockchain Technology Lab	0	0	4	2	50	50	3 Hrs.	
		Total				26	80	00		

PROGE	RAM	YEAR				SEMESTER			
MC	A	II						IV	
			Ηοι	ırs/V	Week		Score		End
Course Code	Description	Course Title	L	Т	Р	Credits	Internal	External	Exam Duration
MMCA470PCP	PROJ	Industrial/Major Project	0	0	32	16	200	200	Viva- voce & Demo nstrati on
Total							400		·

	DISCIPLINE SPECIFIC ELECTIVES	(DSF	E)-I I	N SEC	OND SI	EMESTE	R	
_		Ηοι	Hours/Week			Sc	End	
Course Code	Course Title	L	Т	Р	Credits	Internal	External	Exam Duration
MMCA211PET	Digital Forensics	3	1	0	3	30	70	3 Hrs.
MMCA212PET	Component based Software Engineering	3	1	0	3	30	70	3 Hrs.
MMCA213PET	Cryptography & Cyber Security	3	1	0	3	30	70	3 Hrs.
MMCA214PET	Software Testing & Quality Assurance	3	1	0	3	30	70	3 Hrs.

	DISCIPLINE SPECIFIC ELECTIVES	S (DS	E)-2	IN TH	IRD SE	MESTER	2	
		Ηοι	ırs/V	Week			ore	End
Course Code	Course Title	L	Т	Р	Credits	Internal	External	Exam Duration
MMCA311PET	Cloud Computing and Virtualization	3	1	0	3	30	70	3 Hrs.
MMCA312PET	Distributed Systems	3	1	0	3	30	70	3 Hrs.
MMCA313PET	Computer Graphics	3	1	0	3	30	70	3 Hrs.
MMCA314PET	Artificial Intelligence	3	1	0	3	30	70	3 Hrs.
MMCA315PET	Data Mining	3	1	0	3	30	70	3 Hrs.
MMCA316PET	Digital Marketing	3	1	0	3	30	70	3 Hrs.
MMCA317PET	Internet of Things	3	1	0	3	30	70	3 Hrs.
MMCA318PET	Compiler Design	3	1	0	3	30	70	3 Hrs.
MMCA319PET	Pattern Recognition	3	1	0	3	30	70	3 Hrs.

	DISCIPLINE SPECIFIC ELECTIVE	S (DS	E)-3	IN TH	IRD SE	MESTEF	ł	
		Ηοι	ırs/'	Week			ore	End
Course Code	Course Title	L	Т	Р	Credits	Internal	External	Exam Duration
MMCA321PET	Web Technology	3	1	0	3	30	70	3 Hrs.
MMCA322PET	Artificial Neural Network	3	1	0	3	30	70	3 Hrs.
MMCA323PET	Semantics Web	3	1	0	3	30	70	3 Hrs.
MMCA324PET	PHP Programming	3	1	0	3	30	70	3 Hrs.
MMCA325PET	Soft Computing	3	1	0	3	30	70	3 Hrs.
MMCA326PET	Deep Learning	3	1	0	3	30	70	3 Hrs.
MMCA327PET	Web Mining	3	1	0	3	30	70	3 Hrs.
MMCA328PET	Natural Language Processing	3	1	0	3	30	70	3 Hrs.

MMCA	se Code				Course	Title			Lect	ture		
	A111FCT			Sta	tistical	Analysis			LI	ΓР	Seme	ster: I
Version:					oval: 16	th BoS 1	7-11-2022		3 1	l 0		
	Scheme	of Ins	tructio	1			S	cheme o	of Exami	nation		
No.	of Periods	: 60) Hrs.					M	aximum	Score	: 100)
Perio	ods/Week	: 4						Inter	nal Eval	uation	: 30	
	Credits	: 3							End Ser	nester	: 70	
	tion Mode		ecture					E	lxam Du	ration	: 3 H	lrs.
	site(s): Basi	c know	ledge o	f Mathe	matics							
 To pr life pi To ur To lease 	Dejectives: rovide stude roblems. nderstand p arn the stat nderstand t	robabil istical j	ity distr paramet	ibution ers for	s and tl differei	heir prop nt distrib	oerties. outions, co	orrelatio			-	eal-
	Outcomes (C			rypound	.515 anu	signine		•				
COs No.					Staten						oped Pro tcomes ((POs)
CO ₁	Apply d										P0 ₁ , P0	2
CO ₂	-						on data.				P05	
CO ₃	problem	s.	-	·			slate and s				PO2	
CO ₄	Develop probabi		em solv	ving teo	chnique	s neede	d to accu	irately o	calculate	2	PO4	
Course	e PO ₁		apping	of cour	se outc	omes wi	th progra	m outco	mes		1	T
Outcom		PO_2	PO ₃	PO_4	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
Outcom CO1	es		PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO ₁	2	PO ₂	PO ₃	PO ₄		PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO ₁ CO ₂	es	2	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO ₁ CO ₂ CO ₃	es		PO ₃			PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO ₁ CO ₂	es	2		2	2				PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
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	and difference of standard deviations Sampling Distributions: t- distribution,
	Chi-square distribution, F-distribution, Standard and Probable errors, Different
	Methods of Estimation, Testing of Hypothesis -Type I and Type II errors,
	classification of hypothesis tests; large & small sample tests.
Exar	mination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	ional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks)
whic	ch is mainly end semester examination.
Text	t Books:
1	Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, Third
	Edition, Elsevier Academic Press.
2	S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics – 1st Edition S Chand
Refe	erence Books:
1	Kai Hwang, "Advanced Computer Architecture", Tata McGraw-Hill
2	J. Susan Milton, Jesse C. Arnold, Introduction to Probability & Statistics - 4th Edition, Tata McGraw
	Hill

Course					Course					ture	_		
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No. of	Periods		structio 60 Hrs.	n			2	cheme o			<u> </u>	100	
	s/Week		1 1						aximun mal Eva	luation	:	30	
Perious	Credits		<u>+</u> 1							mester	:	70	
Instructio			Lecture							uration		3 H	rs
Prerequisi				lgorith	ms				Main D	aración	·	011	10.
Course Ob		a otra											
develoj 2. To gain design 3. To lear	pment. n knowleo activities n about s	dge of oftwa	⁷ various re requir	softwai ements	re mode analysi	els as wa s and sp	nallenges nterfall an ecification ce and de	n.	tionary				
Course Ou	tcomes (O	CO):											
COs No.					Stater	nent							ogram
				_		0							(POs)
CO ₁						oftware	engineeri	ing discij	pline wi	th	PC	D ₁ , PC	\mathbf{D}_2
CO			ineering wledge (varo mo	lolg						
CO_2	Elabora	ие кно	owiedge	or vario	us soltv	vare moo	leis					PO ₂	
CO ₃						-	s and spe					PO ₄	
CO ₄	Able to	get th	e knowle	edge of	various	software	e design a	ctivities				PO ₃	
PO ₁₂ - Life-lo	PO ₁			of cour	rse outc PO5	omes wi	th progra PO 7	m outco PO ₈	mes PO ₉	PO ₁₀	Р	O 11	PO ₁₂
Outcomes CO ₁	2	2											
CO1 CO2	Z	2											
CO ₃				2									
CO ₄			2	-									
•				Reason	able; 2 ·	- Signifi	cant; 3 – 9	Strong	1	1			
Detailed C	ontents:				,		,						
Unit	: 1	Soft Proc Soft Soft	ware Cl esses an ware Cris ware Pro	haracte d Produ sis, Soft cess an	ristics, 1ct, Met ware de d lifecy	Compo thods an evelopme cle mode		Applicatio Generic V gms, Tec	ons, L View of chnique	ayered Softwai s of Pro	Teo re Er cess	chno ngine Mod	logies, ering, elling,
Unit	: 2	requ Diag Data	irements ram, Dat Dictiona	s specif aflow N ary.	fication Aodel, ((SRS) s Control I	Specifica tandards, Flow Mod	Analysi el, Cont	s and rol and	Design Proces	Moo s Sp	dellir ecific	ng: ER cation,
Unit: 3 Software Design: Software architecture, Modular Design-cohesion and coupling, Process-oriented design, Process and Optimization, Data-oriented design, User- interface design, Real-time software design, Architectural Designing, Interface Design, Procedural Design, Object Oriented Design. CASE Tools: Computer-aided software engineering, Introduction to CASE, Building Blocks of CASE, Relevance of CASE tools, High-end and low-end CASE tools, automated support for data dictionaries, DFD, ER diagrams, Integrated Case													
Environment, CASE workbenches.Unit: 4Coding and Testing: Choice of Programming languages, Coding standards for Software. User Interface Design: Concepts of Ui, Interface Design Model, Internal and External Design, Evaluation, Interaction and Information Display Testing													

		Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing.
	Unit: 5	Configuration Management: Concepts in Configuration Management, The Configuration Management Process: Planning and Setting up Configuration Management, Perform Configuration Control, Status Monitoring and Audits. Software Maintenance: What is software maintenance, Maintenance Process & Models, Reverse Engineering, Software re-engineering, Configuration Management issues and concept, Configuration planning & techniques, Software versions and change control process, Documentation.
Exar	mination and Ev	aluation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	ional exams/ as	signments/ quiz/ seminar presentation etc. and external evaluation (70 marks)
whic	ch is mainly end	semester examination.
Text	t Books:	
1	Hennessey and	Patterson, "Computer Architecture: A quantitative Approach", Morgan Kaufman.
2	Kai Hwang, I	Faye A. Briggs, "Computer Architecture and Parallel Processing" McGraw-Hill
	international E	
Refe	erence Books:	
1	Kai Hwang, "Ac	lvanced Computer Architecture", Tata McGraw-Hill
2	El-Rewini, H.,	& Abd-El-Barr, M. (2005). Advanced computer architecture and parallel processing
	(Vol. 42). John V	
	• • •	х Х

Course C					Course					ture		
MMCA112	PCT					Vetwork				Γ Ρ	Sem	ester: I
Version: 1.2	<u>a 1</u>				oval: 16	ith BoS 1	7-11-2022		.	1 0		
NT 61	Scheme	1 1		n			5	Scheme o			10	
No. of I) Hrs.						aximum		: 10 : 30	
Periods		: 4 : 4							nal Eval		: 30 : 70	
Instruction	Credits	• -	ecture						End Sei Exam Di) Hrs.
Prerequisit				f Mathe	matics	and Dhy	sics	ſ		liation	. 3	пі s.
Course Obje			icuge o	1 Wathe	matics	and Thy	5105					
		he com	puter n	etwork	s and co	oncentra	tes on bu	uilding a f	firm fou	ndation		
							aspects of					
1							vered ap					tween
							is layers.	L				
4. To acqu	ire the k	nowled	lge of ci	yptogra	aphy an	d its use	s in data	commun	ication	over the	e interr	net.
Course Out	comes (O	CO):										
COs No.					Stater	nent				Ma	pped P	rogram
										Ou	itcome	s (POs)
CO ₁			,				nd TCP/I				PO	
CO_2	Able to	know a	bout Ph	iysical L	ayer ar	nd Data I	Link Laye	r			PO	3
CO ₃	Unders	tand th	e conce	ent of Ne	etwork	Laver					PO	0
				-		•					10	3
CO ₄	Demon	stratior	n of Trai	nsport a	and App	olication	Layer				PO	5
Course		N	lapping	of cour	se outc	omes wi	th progra	im outco	mes			
Course	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
Outcomes CO ₁	2											
	2		2									
CO ₂			2									
CO ₄			-		1							
004			1-	Reason	able: 2 ·	– – Sianifi	cant; 3 – 1	Strona				
Detailed Co	ntents:					~ 1911.91						
		Intro	duction	To Net	works a	nd Com	municatio	on Media	: Uses -	- Netwo	rk Har	dware –
Unit:							Models					
Unit.	1						nmunicat				dia – V	Vireless
							– Satellite					
							Frequence	cy, Bandy	width, E	Baud Ra	te, Har	monics,
			num da						Dana an D			
Unit: 2	2						r design					
							rotocols ocation -					
		Stand		victilou	5 CIR		ocation	munipi	e neces	5 proco	0015	
				Laver:	Networ	k Laver o	lesign iss	ues – Ro	uting als	orithm	s – Cor	gestion
Unit: 3	3						ng – Netw				201	0.2.1011
T T · ·							ort Servic				ols – I	nternet
Unit: 4	+						erforman					
							Layer de			omain N	lame S	ystem -
Unit: S	5	Electr	onic M	ail – W	orld W	ide Web	– Multin					
			rity - Ba									
Examinatio												
sessional ex	•	-	• -	•	inar pr	esentatio	on etc. an	d extern	al evalu	ation (70) marks	s) which
is mainly en Text Books:		ter exa	minatio	n.								

1	Andrews S. Tanenbaum, "Computer Networks", Prentice Hall of India Private Limited, (4th Edition), 2003.
2	Leon Garcia and Widjaja, "Communication Networks - Fundamental concepts and key architecture",
	Tata McGraw Hill, 2001
Refe	erence Books:
1	Internetworking with TCP/IP Volume 1: Principles Protocols, and Architecture, Douglas Comer and
	Prentice Hall, fifth edition, 2006.
2	Network Protocols: Signature Edition, Matthew G. Naugle. Mcgraw-Hill Signature Series

Course C	ode			(Course	Title			Le	cture	;			
MMCA113	PCT			Ope	erating	Systems			L	Т	Р	Se	emes	ter: I
Version: 1.2					oval: 16	th BoS 1	7-11-2022		3	1	0			
		of In	struction	1			S	cheme o	f Exar	ninat	ion			
	Periods		60 Hrs.						aximu			:	100	
Periods		: 4							nal Ev			:	30	
	Credits	: 4							End S			:	70	
Instruction			Theory &		al			E	lxam I	Durati	on	:	3 Hı	·s.
Prerequisit	<u>, ,</u>	iputer	fundam	entals										
Course Obje		11	<u>C</u>	- 1:4 C	0	·								
			function				em. em design							
1							lication s		esion	and n	erfo	rma	nce	
							disc man			una p	ciio	1 1110	ince.	
Course Out		-						-8						
COs No.		/			Stater	nent					Mar	ppe	d Pro	gram
											-	-	mes (•
CO ₁	Exhibit	famili	arity witł	n the fu	ndamer	ntal conc	epts of o _l	perating	syster	ns.		PC	D 1, PO 2	2
CO_2							ign and it	s impact	s on				PO ₃	
	<u> </u>	Ū,	stems de	<u> </u>	<u> </u>								103	
CO ₃	Exhibit issues.	comp	etence in	recogr	nizing o	perating	systems	features	and				PO ₃	
CO ₄	Underst manage		g the var	ious co	ncepts	associat	ed with m	nemory					PO ₄	
sustainability PO 12- Life-lon		g					mmunicat			t mana	igem	enta	and fii	nance,
Course	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO9	P	D ₁₀	P	O ₁₁	PO ₁₂
Outcomes			103	104	105	100	10/	108	109	1	J 10	-	UII	1012
CO ₁	2	2	-											
	-		2											
CO ₃ CO ₄			2	1										
CO4			1-	-	ahle [.] 2 -	- Sianifi	cant; 3 – 5	Strong						
Detailed Co	ntents:		1	Kcuson	ubic, 2	Signiji	<i>unt</i> , 5 k	scrong						
Unit:	1	Batc Mult Syst	h, Intera iuser Sys	active, stems, 1 types, 0	Time-s Multipr	sharing, ocessor	functions Real-Tim Systems, m Structu	e Syste Multithi	m, M readeo	ultipr 1 Syst	oces cems	ssor , P0	Sys Sys	tems, tems;
Unit: 1	2	/Co Pete Con	nsumer 1 rson's so currency	Problem plution, - Dinin	n, Mutu Semaj g Philos	ial Exclu phores, sopher F	Concept, sion, Crit Test and Problem, S es, Proces	ical Sect Set op Sleeping	tion P eratio Barbe	roblei n; Cl	m, D lassio	eke cal	er's so Prob	olutio lem i
Unit: :	3	CPU Proc man char	Schedu ess Trai agement	ling: Sensition , Sche ion, Pre	cheduli Diagra duling	ng Con m, Proc Algorit	cepts, Pe ess Cont hms, De ance and	erforman rol Bloc eadlock:	ce Cr k (PC Syste	B), T em 1	hrea mod	ids el,	and Dea	their dlock
Unit: 4	4	Men with cond orga	ory Man variable cepts, Pa nization	agemen partitio ge repi and ac	ons, Pro laceme ces me	tection s nt algor chanism	nming wi chemes, I ithms, Th File dire virectory i	Paging, S trashing, ectories,	egmer File and	ntatio syste File s	n, Vi m S	irtu tru	al me cture	mory , File
Unit:	5	I/O	Manage	ment a	nd Disl	k Sched	uling: I/C eduling,) device	s, and	l I/O				

	utilities, Unix files, directory structure, file security, Bourne shell programming features, systems call classification and basics, Linux : System components,
	Networking software layers.
Exa	nination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	onal exams/assignments/quiz/seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semester examination.
Text	Books:
1	Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2	Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
Refe	rence Books:
1	Harvey M Dietel, "An Introduction to Operating System", Pearson Education
2	D M Dhamdhere, "Operating Systems: A Concept based Approach", McGraw Hill

	Code				Course				Lect			
MMCA160	DAEP						cation Lal	2	LI		Se	mester: I
Version: 1.2	~ 1				:oval: 16	th BoS 1	7-11-2022		0 0			
	Scheme			1			S	cheme o				100
	Periods		Hrs.						aximum		:	100
Periods		: 4 : 2							nal Eval		:	50
Instructio	Credits		actical						End Ser		:	50 3 Hrs.
Prerequisit								Ē	xam Du	ration	·	3 HIS.
Course Obje		Terequ	isite									
 To sensi To bring providir To impr To train 	itize stud g about a ng an opp ove the f students	consist ortunit luency s to use	tent acc y for pr of stud	ent and actice : ents in	d intellig in speał spoken	gibility ir cing. English a	n sounds, n students and neutr blic speak	' pronun alize the	ciation ir moth	of Engli er tong	sh b	у
Course Out	comes (C	.0):			Stater	nont				Ma	nned	Program
COS NO.					State	liellt						nes (POs)
CO ₁	Underst	and c	ompre	nend a	ind and	alvze th	e profes	sional a	nd soft			O ₉ , PO ₁₀
001							comprehe				00, 1	03, 1 010
	present	lucid s	kills in f	ree wri	ting	, ,	1	U				
CO ₂	Underst	and th	e basic	gramn	nar tech	niques a	and utilize	e it in e	nhancin	g PO	D 9, P	O ₁₀ , PO ₁₂
	languag											
CO ₃				techni	cal arti	cles and	presentir	ng paper	s on an	y PO	D 9, P	O ₁₀ , PO ₁₂
	topic of											
CO ₄	Enable t	the deve	elopme	nt in sh	aring in	formatic	n about fa	amily and	1 friends	S.	PO ₁₀	o, PO 12
Course							th program					_
Outcomes CO ₁	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	РО 9 2	PO ₁₀	PC	D ₁₁ PO ₁₂
CO ₂												
CO ₃										2		2
									2	2 2		
CO ₄										2 2 2		2 2 2
CO ₄			1 -	Reason	able; 2 -	- Signific	cant; 3 – S	trong	2	2		2
CO ₄ Detailed Co	ntents:		1-	Reason	able; 2 -	- Signific	cant; 3 – S	strong	2	2		2
			luction	to Phor	netics –	Speech	Sounds –	Vowels &	22	2 2		2
Detailed Co	1		luction	to Phor	netics –	Speech		Vowels &	22	2 2		2
Detailed Co Unit: Unit: Unit:	1 2 3	Struct Minim	luction cure of S nal pairs	to Phor Syllable s – wore	netics – s – wea 1 accen	Speech k forms a t and str	Sounds – & strong f ess shifts	Vowels &	22	2 2		2
Detailed Co Unit: Unit:	1 2 3	Struct Minim Intona	luction cure of s nal pairs ation an	to Phor Syllable s – word d comr	netics – s – wea d accen non err	Speech k forms a t and str ors in pr	Sounds – & strong f ess shifts onunciati	Vowels & orms on	2 2 & Conso	2 2 nants		2 2
Detailed Co Unit: Unit: Unit:	1 2 3	Struct Minim Intona Conve	luction ture of s nal pairs ation an ersation	to Phor Syllable s – word d comr practi	netics – s – wea d accen non err ice – o	Speech k forms a t and str ors in pr oral pres	Sounds – & strong f ess shifts onunciati entation	Vowels & orms on skills a.	2 2 & Conso Greeti	2 2 nants ng and		2 2 ve taking
Detailed Co Unit: Unit: Unit:	1 2 3 4	Struct Minim Intona Conve	luction ture of s nal pairs ation an ersation lucing o	to Phor Syllable 5 – word Id comr practioneself	netics – s – wea d accen non err ice – o and oth	Speech k forms of t and str ors in pr oral pres ers b. Ap	Sounds – & strong f ess shifts onunciati entation pologizing	Vowels & forms on skills a.	2 2 & Conso Greeti: pting, re	2 2 nants ng and equestin	ng ar	2 2 ve taking nd making
Detailed Co Unit: Unit: Unit: Unit:	1 2 3 4	Struct Minim Intona Conve introd polite	luction ture of s nal pairs ation an ersation lucing c conver	to Phor Syllable s – word d comr practioneself sation	netics – s – wea d accen non err ice – o and oth c. Givin	Speech k forms a t and str ors in pr oral pres ers b. Ap g instrue	Sounds – & strong f ess shifts onunciati entation pologizing ctions and	Vowels & orms on skills a. , interru l directio	2 2 & Conso Greeting pting, re ons: spe	2 2 nants ng and equestir aking c	ng ar of hy	2 2 ve taking nd making
Detailed Co Unit: Unit: Unit: Unit: Unit:	1 2 3 4 5	Struct Minim Intona Conve introd polite situat	luction cure of s al pairs ation an ersation lucing c conver ions d. 1	to Phor Syllable d comr praction sation Narrati	netics – s – wea d accen non err ice – o and oth c. Givin ng, expr	Speech k forms of t and stru- ors in pr oral pres ers b. Ap g instrue ressing o	Sounds – <u>& strong f</u> ess shifts onunciati entation oologizing ctions and pinions an	Vowels & orms on skills a. , interru l directiond teleph	2 2 & Conso Greetin pting, re ons: spenone int	2 2 nants ng and equesti aking c eractio	ng ar of hy ns	2 2 ve taking nd making pothetica
Detailed Co Unit: Unit: Unit: Unit: Examination	1 2 3 4 5 n and Ev	Struct Minim Intona Conve introd polite situati	luction ture of s al pairs ation an ersation lucing c conver ions d. 1 n Patte	to Phor Syllable d comr praction sation Narratii rn: It in	netics – s – wea d accen non err ice – o and oth c. Givin ng, expr iclude b	Speech k forms of t and str ors in pr oral pres ers b. Ap g instruct essing o oth inter	Sounds – & strong f ess shifts onunciati entation pologizing ctions and pinions an rnal evalu	Vowels & orms on skills a. , interru d direction nd teleph ation (50	2 2 & Conso Greetin pting, re ons: spe none int 0 marks)	2 2 nants ng and equestine eraction compr	ng ar of hy ns ising	2 2 ve taking nd making pothetica
Detailed Co Unit: Unit: Unit: Unit:	1 2 3 4 5 n and Ev ams/ ass	Struct Minim Intona Conve introd polite situati aluation	luction cure of s al pairs ation an ersation lucing c conver ions d. 1 n Patte nts/ qu	to Phor Syllable - word d comm praction sation Narration rn: It in iz/ sem	netics – s – wea d accen non err ice – o and oth c. Givin ng, expr iclude b	Speech k forms of t and str ors in pr oral pres ers b. Ap g instruct essing o oth inter	Sounds – & strong f ess shifts onunciati entation pologizing ctions and pinions an rnal evalu	Vowels & orms on skills a. , interru d direction nd teleph ation (50	2 2 & Conso Greetin pting, re ons: spe none int 0 marks)	2 2 nants ng and equestine eraction compr	ng ar of hy ns ising	2 2 ve taking nd making pothetica
Detailed Co Unit: Unit: Unit: Unit: Examination sessional ex is mainly en	1 2 3 4 5 n and Ev ams/ ass d semest	Struct Minim Intona Conve introd polite situati aluation	luction cure of s al pairs ation an ersation lucing c conver ions d. 1 n Patte nts/ qu	to Phor Syllable - word d comm praction sation Narration rn: It in iz/ sem	netics – s – wea d accen non err ice – o and oth c. Givin ng, expr iclude b	Speech k forms of t and str ors in pr oral pres ers b. Ap g instruct essing o oth inter	Sounds – & strong f ess shifts onunciati entation pologizing ctions and pinions an rnal evalu	Vowels & orms on skills a. , interru d direction nd teleph ation (50	2 2 & Conso Greetin pting, re ons: spe none int 0 marks)	2 2 nants ng and equestine eraction compr	ng ar of hy ns ising	2 2 ve taking nd making pothetica
Detailed Co Unit: Unit: Unit: Unit: Examination sessional ex is mainly en Text Books:	1 2 3 4 5 n and Ev ams/ ass d semest	Struct Minim Intona Conve introd polite situation signmer er exan	luction cure of s al pairs ation an ersation lucing o conver ions d. 1 n Patte nts/ qu nination	to Phor Syllable - word d comr praction sation Narratin rn: It in iz/sem 1.	netics – s – wea d accen non err ice – o and oth c. Givin ng, expr iclude b iinar pro	Speech k forms of t and stru- ors in pr oral pres ers b. Ap g instruc- ressing o oth inter esentatio	Sounds – & strong f ess shifts onunciati entation pologizing ctions and pinions an rnal evalu	Vowels & orms on skills a. ; interru l direction d teleph ation (50 l externa	2 2 & Conso Greetin pting, re ons: spe none int 0 marks)	2 2 nants ng and equestine eraction compr	ng ar of hy ns ising	2 2 ve taking nd making pothetica
Detailed Co Unit: Unit: Unit: Unit: Unit: Examination sessional ex is mainly en Text Books: 1 "Enjoy	1 2 3 4 5 n and Ev ams/ass d semest ing Every	Struct Minim Intona Conve introd polite situation signmer er exan	luction sure of s al pairs ation an ersation lucing of conver ions d. I n Patte nts/ qu nination	to Phor Syllable - word d comr praction sation Narratin rn: It in iz/ sem n. Publish	netics – s – wea d accen non err ice – o and oth c. Givin ng, expr iclude b inar pro ed by Sa	Speech k forms of t and stru- ors in pr oral pres ers b. Ap g instru- cessing o oth inter esentation	Sounds – & strong f ess shifts onunciati entation pologizing ctions and pinions an rnal evalu on etc. and	Vowels & orms on skills a. , interru d direction d teleph ation (50 l externa erabad.	2 2 & Conso Greetin pting, ro ons: spe none int marks) I evalua	2 nants ng and equestin eaking c eraction compr tion (50	ng ar of hy ns ising) mar	2 2 ve taking nd making pothetica
Detailed Co Unit: Unit: Unit: Unit: Unit: Examination sessional ex is mainly en Text Books: 1 "Enjoy 2 Innova Found	1 2 3 4 5 n and Ev ams/ass d semest ing Every ite with F ation Boo	Struct Minim Intona Conve introd polite situation signmer er exan v day Er English:	luction sure of s al pairs ation an ersation lucing of conver ions d. I n Patte nts/ qu nination	to Phor Syllable - word d comr praction sation Narratin rn: It in iz/ sem n. Publish	netics – s – wea d accen non err ice – o and oth c. Givin ng, expr iclude b inar pro ed by Sa	Speech k forms of t and stru- ors in pr oral pres ers b. Ap g instru- cessing o oth inter esentation	Sounds – <u>& strong f</u> ess shifts onunciati entation oologizing ctions and pinions an mal evalu on etc. and	Vowels & orms on skills a. , interru d direction d teleph ation (50 l externa erabad.	2 2 & Conso Greetin pting, ro ons: spe none int marks) I evalua	2 nants ng and equestin eaking c eraction compr tion (50	ng ar of hy ns ising) mar	2 2 ve taking nd making pothetica
Detailed Co Unit: Unit: Unit: Unit: Unit: Examination sessional ex is mainly en Text Books: 1 "Enjoy 2 Innova Found Reference E	1 2 3 4 5 n and Ev ams/ ass d semest ing Every ite with F ation Boo Books :	Struct Minim Intona Conve introd polite situati aluation signmer er exan v day Er English: oks.	luction sure of s al pairs ation an ersation lucing c conver ions d. 1 n Patte nts/ qu nination nglish", A Cour	to Phor Syllable - word d comr praction Sation Narration rn: It in iz/ sem n. Publish se in Er	netics – s – wea d accen non err ace – o and oth c. Givin ng, expr iclude b inar pro ed by Si nglish fo	Speech k forms of t and stru- ors in pr oral pres ers b. Ap g instruc- ressing o oth inter esentation angam B or Engine	Sounds – & strong f ess shifts onunciati entation pologizing ctions and pinions an minions an rnal evalu on etc. and pooks, Hyd ering Stu	Vowels & orms on skills a. , interru d direction d teleph ation (50 l externa erabad.	2 2 & Conso Greetin pting, ro ons: spe none int marks) I evalua	2 nants ng and equestin eaking c eraction compr tion (50	ng ar of hy ns ising) mar	2 2 ve taking nd making pothetica
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MMCA211	PCT		Da	ta Stru	ctures a	and Algoi	rithms		L	Г Р	Semes	ster: II			
Version: 1.2							7-11-2022		3 1	1 0					
	Scheme	e of Inst	truction	ı			S	cheme o	of Exami	ination					
No. of I	Periods		Hrs.					М	aximum	Score	: 100)			
Periods	/ Week	: 4						Inter	mal Eval	uation	: 30				
	Credits	: 4							End Ser	nester					
Instruction			cture					E	Exam Du	iration	ation : 3 Hrs.				
-	(s): Programming for Problem Solving														
Course Obje															
problem 2. To make	ns. e studen ole them res.	ts know to wri	about te and	the con compa	cepts o re the a	of search	es, trees, ing and so ns for so	orting te	chnique	s.					
Course Out			1 5	5											
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CO ₂							ata struct	ures wit	h respec	ct	PO ₂ , P	O 3			
	to its pe	erforma	nce to s	solve a	real-wo	orld prob	lem.		-						
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CO ₄ PO ₁ - Enginee							erformanc				PO ₃ , P				
							D ₆ - The en mmunicat								
PO ₁₂ - Life-lon Course		g	- Individı	ual or tea	am work	, РО 10- Со		ion, PO 11-	Project n						
PO ₁₂ - Life-lon Course Outcomes	g Learnin PO1	g M PO2	- Individu apping	ual or tea of cour PO 4	am work se outc	, PO 10- Co omes wit	mmunicat th progra	m outco	Project n mes	nanagem	ent and f	inance,			
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PO ₁₂ - Life-lon Course Outcomes CO ₁ CO ₂	g Learnin PO1	g M PO2	- Individu apping	ual or tea of cour PO 4	am work se outc PO5	, PO 10- Co omes wit	mmunicat th progra	m outco	Project n mes PO ₉	nanagem	ent and f	inance,			
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PO ₁₂ - Life-lon Course Outcomes CO ₁ CO ₂ CO ₃	g Learnin PO1 2	g PO ₂ 1	- Individu apping PO ₃ 2 2	of cour PO4 2 1	en work se outc PO ₅	, PO ₁₀ - Co omes wit PO ₆	mmunicat th progra	n outcom PO ₈	Project n mes PO ₉	nanagem	ent and f	inance,			
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PO ₁₂ - Life-lon Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Co	g Learnin PO1 2 I I I I I	g M PO2 1 2 Introo Time (ADT) Arrays for 1 Imple List, Trave Stacks Imple Evalua Tail re Queue imple: Trees tree, I Searc	PO3 PO3 PO3 2 2 1 - 1 comple: 5: Defini -D,2-D, mentati Circular rsal. 5: Abstra mentati ation of ecursion e: Creation e: Creation e: Creation binary Huffmar hing with	al or tea of cour PO4 2 1 Reason to Data xity, Asy ition, Si 3-D an ion and rly Linl act Data ion and rly Linl act Data ion of S postfix n. Trade te, Add ion of q r tree re n Tree, th Analy	am work se outc se outc PO5 PO5 1 able; 2 - able; 2 - Structury mptoti and n-E Pointe aced Lis a Type, 1 btack in a expresent eoffs be , Deletures, 1 epreser <u>B Tree</u> , ysis: Co	PO ₁₀ - Co omes with PO ₆ - Significe ure, Algo ic Notation d Multidi O Array r Implen ict, Opera Primitive C, Appli ssion, Ite etween it e, Full a Dequeue intation, t B+ Tree. ncept of	mmunicat th progra PO7 PO7 rithm, Pe ons, Time amensiona Applicat nentation ations on estack op cation of eration ar teration a nd Empt and Prior ree trave	The second secon	Project n mes PO ₉ 1 1 ce Analy trade-of , Derivat arrays. y Linked ted List : Push & refix an rsion- Pr rsion. Q lar queu ue. nplete b	PO ₁₀ PO ₁₀ rsis-Spa f. Abstra tion of It Linked I Lists, . Insert Pop, Ar d Postfi rinciple queues: ues, Arr binary tr	PO ₁₁ PO ₁₁ ce comp act Data ndex For d lists: Doubly I cion, De ray and I x Express s of recu Operatio ray and ree, heap dex Sequ	PO12 PO12 PO12 PO12 PO12 PO12 PO12 PO12			

		in Hashing. Sorting with Analysis: Insertion Sort, Selection, Bubble Sort, Quick Sort,
		Merge Sort and Heap Sort
		Greedy method: Knapsack problem, Graphs, Graph Traversal: DFS & BFS. Spanning
	Unit: 4	Trees: Prim's and Kruskal's algorithm. Dijkstra's algorithm. Dynamic programming:
	01111. 4	Multistage Graphs, Floyd-Warshall algorithm, Optimal Binary Search Trees, O/1
		Knapsack problem, Travelling Sales Person Problem.
		Back tracking: n-Queen Problem, Graph Colouring, Hamiltonian cycles.
	Unit: 5	Branch and Bound: LIFOBB and FIFOBB.
	Onit. 5	NP-Hard and NP-Complete problems: Basic Concepts, Non-Deterministic Algorithms,
		NP - Hard and NP-Complete Classes, Cook's theorem
		aluation Pattern: It include both internal evaluation (30 marks) comprising two class
		signments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semest	ter examination.
Text	t Books:	
1	Fundamentals	of Data Structures, Horowitz and Sahani, Galgotia Publications Pvt Ltd Delhi India.
2	Algorithms, Co	reman, Rivest, Lisserson, PHI, Third Edition
Refe	erence Books:	
1	Design and Ana	alysis of Algorithms, Manas Ranjan Kabat, PHI.
2	Data Structure	s, Lipschutz, Schaum's Outline Series, Tata McGraw-hill Education (India) Pvt. Ltd.

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Course C					Course				· · · · ·	ture			
MMCA212					0	ement Sy				T P	Semes	ster: 11	
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		a structure & Algorithms									1.1		
Course Obje		i structure & Algorithms											
1. To descr	ribe the f	undam	ental el	ements	of data	base ma	nagement	t system:	s and st	ructure	e of datat	bases.	
							n a databa						
					onal dat	a model,	entity-re	elationsh	ip mod	el, relat	ional dat	abase	
	relationa				1 1.	1 / 1		. 1.1		1			
							ise securi		neir app	Dicatio	ns in real	time	
Course Out	•		abase a	na mio	rmatioi	i associa	ted with t	them.					
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CO ₃						n databas					PO ₃ , PO		
CO ₄				•	<u> </u>		access tee	chniques	•		PO ₂ , P (
PO1- Enginee	ering Kno	wledge,	PO 2 ⁻	Problem	analysi	s, PO 3-	Design/de	evelopme	nt of s				
investigations													
sustainability			Individu	ual or tea	am work,	PO ₁₀ - Co	mmunicati	ion, PO 11-	Project	manager	nent and f	inance,	
PO ₁₂ - Life-lon	ig Learnin		anning	of cour	se outo	amos wit	h progra	moutco	noc				
Course									1105				
Outcomes	PO ₁	PO_2	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂	
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CO ₂			2		1								
CO ₃			2		1								
CO ₄		2	2										
			1 -	Reason	able; 2 -	· Signific	ant; 3 – S	Strong					
Detailed Co	ntents:												
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Unit:	1						base Sys						
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							odel – In	0.					
							Querying						
							s – Des						
		Relational Algebra – Selection and projection set operations – renaming – Joi – Division – Examples of Algebra overviews – Relational calculus – Tup											
							ional cal						
Unit:	2						nt – P						
							elated to						
							Norma						
		Decor	npositi	on –	Depe	endency	preser	ving D	ecomp	osition	- Se	chema	
				n Data	base D	esign –	Multi val	ued Dep	enden	cies – I	FORTH N	lormal	
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Unit:	3						ples of B						
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		Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.
	Unit: 4	Transaction Concept- Transaction State- Implementation of Atomicity and Durability Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Base Protocols – Multiple Granularity.
	Unit: 5	Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems. Introduction of No SQL Database
		aluation Pattern: It include both internal evaluation (30 marks) comprising two class
	,	signments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
	ainly end semest	er examination.
Text	t Books:	
1	Data base M 3rd Edition	anagement Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill
2	Data base Syste	em Concepts, Silberschatz, Korth, McGraw hill, V edition
Refe	erence Books:	
1	Fundamentals	of Database Systems, Elmasri Navrate Pearson Education
2	Introduction to	Database Systems, C.J.Date Pearson Education

Course C					Course				Lee	cture				
MMCA213	PCT				0	amming			L	T P			ster: II	
Version: 1.2					'oval: 16	th BoS 1	7-11-2022		3	1 0				
	Scheme			1			S	cheme o			1 1			
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Periods		: 4				Internal Evalua					:	30		
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	isite(s): Programming for Problem Solving Objectives:													
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2. To intro								principie	ES.					
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													(POs)	
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j	nheritan	ice, and	polymo	orphism	ı.			_						
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	classes a													
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PO ₁ - Enginee														
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PO ₁₂ - Life-lon			maiviat		IIII WOLK,	FO 10 ⁻ CO	liiiiuiiicat	1011, FO 11-	FIOJECT	inanagen	ient a	inu i	mance	
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			apping (of cours	se outco	omes wit	h progra	m outcoi	nes					
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	PO ₁									PO ₁₀	PC	D ₁₁	PO ₁₂	
Outcomes		PO ₂								PO ₁₀	PC	D ₁₁	PO ₁₂	
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Outcomes CO ₁ CO ₂		PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈		PO ₁₀	PC	D ₁₁	PO ₁₂	
Outcomes CO ₁ CO ₂ CO ₃ CO ₄	2	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆		PO ₈	PO ₉	PO ₁₀	PC	D11	PO ₁₂	
OutcomesCO1CO2CO3	2	PO ₂	PO ₃ 2 2 2 1 - 2	PO ₄ 2 Reason	PO 5	PO ₆	PO7	PO ₈	PO ₉					
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Outcomes CO1 CO2 CO3 CO4	2	PO2 2 Java B commoperation	PO ₃ 2 2 2 1 - 2 2 asics - aents, c tors, c	PO ₄ 2 Reasona Review lata typ pperato	PO ₅ 2 2 able; 2 - of OOP pes, var r hiera	PO ₆ Signific Concepriables, archy, e	PO ₇ ant; 3 – S ts, C++ vs constant expressio	PO ₈ Strong Java, His s, scope ns, type	PO ₉	f Java, Ja ife time version	ava b e of and	uzzv var	words iables asting	
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Con	2 ntents:	PO2 2 Java B comm operation	PO ₃ 2 2 2 1 – 1 passics – tors, c tors, c tors, c	PO ₄ 2 Reasona Review lata typ pperato types, c	PO ₅ 2 2 able; 2 - of OOP pes, va r hiera control	PO6 Signific Concep riables, archy, 6 flow-blo	PO ₇ eant; 3 – S ts, C++ vs constant: expressio ck scope	PO ₈ Strong Java, His s, scope ns, type , conditio	PO ₉ 1 story o and l e conv onal sta	f Java, Ja ife time version	ava b e of and	uzzv var ops,	words, iables, asting, break	
Outcomes CO1 CO2 CO3 CO4	2 ntents:	PO2 2 Java B comm opera enume and co	PO ₃ 2 2 2 1 - 1 basics - tors, c tors, c erated to ontinue	PO ₄ 2 Reason Review data typ operato types, c statem	PO ₅ 2 2 able; 2 - of OOP pes, var r hiera control : ents, sin	PO ₆ Signific Conceptriables, archy, e flow-blo mple java	PO7 eant; 3 – S ts, C++ vs constant: expressio ck scope a program	PO ₈ Strong Java, His s, scope ns, type , condition, arrays,	PO9 1 story o and l e conv onal sta input a	f Java, Ja ife time version atement and outj	ava b e of and s, loo put, f	uzzv var l ca ops, form	words, iables, asting break natting	
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		unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes, Guide lines for proper use of exceptions. Multi-threading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, thread groups, daemon threads.
U	nit: 5	APPLETS, JAVA GUI AND DATABASE CONNECTIVITY, Networking - Applets - Applet life cycle methods - Applets based GUI - AWT Introduction - GUI components - Basics of Swings -Accessing database with JDBC basics- Types of Drivers - Basics of Networks Programming, Addresses, Ports, Sockets, Simple Client and Server Program, Multiple Clients and Single Server.
Examina	tion and Eva	aluation Pattern: It include both internal evaluation (30 marks) comprising two class
sessiona	l exams/ ass	ignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is mainly	end semest	er examination.
Text Boo	oks:	
1 Jav	a; the compl	ete reference, 9th editon, Herbert schildt, TMH.
2 Un	derstanding	OOP with Java, updated edition, T. Budd, Pearson education.
Referen	e Books:	
1 He	ad First Java,	Kathy Sierra, Bert Bates, O'Reilly Media; 2 edition (9 February 2005)
2 Int	roduction to	Java programming 6th edition, Y. Daniel Liang, pearson education.

Course (Course TitleLectureComputer System ArchitectureLT											
MMCA214	4PCT										Seme	ester: II	
Version: 1.2	<u> </u>				r oval: 16	th BoS 17	7-11-2022		-	1 0			
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	Periods		0 Hrs.					Maximum Score Internal Evaluation				100	
Periods	/ Week Credits	: 4 : 4										30 70	
Instructio		• -	ecture						Lind Sel			3 Hrs.	
	erequisite(s): Digital Electronics								iration	•	51115.		
Course Obje			10mcs										
		of digita	al comp	onents	of the c	computer	r and thei	r circuits	s.				
							ro-opera			t.			
3. To unde	rstandin	g of the	CPU O	rganiza	ation an	d Input-0	Output O	rganizati	ion.				
			e of mic	roprog	ramme	l control	unit, Mer	nory Org	ganizati	on, I/O	systen	ns, and	
	ocessors.												
Course Out	comes (C	O):											
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					commi	inication	in Input	-Output	device	s	PO ₂ , P	2010	
CO ₃	Standard						in input	Output	uevice	3,	102,1	010	
						0	ache mei	nory an	d virtua	al	PO ₄ , P	O 10	
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	mination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class
	ional exams/assignments/quiz/seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semester examination.
Text	t Books:
1	M. Morris Mano: Computer System Architecture, Pearson Asia / Prentice Hall, Third edition.
Refe	erence Books:
1	William Stallings: "Computer Organization & Architecture", Pearson Education, Sixth: Edition, 2003.
2	P Dandamudi: Fundamentals of Computer Organization and Design, Springer/ Dream Tech
	Publishers, 2003.

Course	Course Code Course Title						Lec	ture					
MMCA2	260PCP		Data	Struct	ures an	d Algoritl	nms Lab		L	Г Р	Seme	ster: II	
Version: 1	1.2		Date	of Appr	·oval: 16	th BoS 17	7-11-2022		0 (0 4			
	Sche	ne of In	struction	n			S	cheme o	f Exami	nation			
	of Perioc		0 Hrs.					Ma	aximum	Score	: 100 : 50		
Perio	ds/Wee								nal Eval				
	Credi								End Sei				
	tion Mod									uration : 3 Hrs.			
	site(s): Programming for Problem Solving												
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		olexity.											
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			, and gra										
CO ₃			rnative i	mpleme	ntation	s of data	structure	s with re	espect t	0 P	O4, PO5,	PO9	
		rmance.	C		1		1	1.			0 00	D O	
CO_4								arching,	sorting	g, P	O ₂ , PO ₃	PO 5	
	Implementation of various algorithms such as searching, sorting Greedy, Dynamic, Back-Tracking and Branch & Bound.												
PO ₁ - Engi	Gree	dy, Dyna Dowledg	m_{1C}, Bac	K-1 rack	ing and	Branch	& DOUIIU. Design /de	velonmer	t of sc	lutions		'onduct	
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i. Kruskal's Algorithm

ii. Prim's Algorithm

12. Write a program to implement the TSP problem.

Examination and Evaluation Pattern: It include both internal evaluation (50 marks) comprising two class sessional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (50 marks) which is mainly end semester examination.

Text Books:

1 Data Structures and Program Design in C, R. Kruse et al, Pearson Education.

2 Data Structure Using C, Thareja, Oxford Higher Education

Reference Books:

1 Data Structure Using C, AK Sharma, Pearson Education India.

2 Data Structures, Lipschutz, Schaum's Outline Series, Tata McGraw-hill Education (India) Pvt. Ltd.

Cours	e Code				<u>Cours</u> e	Title			Course Title Lectu								
MMCA	261PCP		Data	base M	anagem	ent Syst	ems LAB		L	Т	Р	Seme	ster: I				
Version: 1	.2						7-11-2022		0	0	4						
	Schem	e of In	struction					cheme o	f Exa	mina	ation						
No.	of Periods	1 1	0 Hrs.						aximu			: 100)				
	ds/Week							Inter				: 50					
	Credits								End S			: 50					
Instruc	tion Mode		ractical								uration : 3 Hrs						
	equisite(s): Data Structure							Dure		. 01							
-	urse Objectives:																
	To understand the structure of databases. To learn how to create a database. To analyze Query processing and decomposition.																
	ndling diff						ta. combi	ning inte	errela	ted o	lata.						
	utcomes (,	8									
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			nal data									PO ₃ , P					
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	ity, PO 8- Etl																
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		Ν	lapping	of cours	se outco	omes wit	h prograr	n outcon	nes								
Course												ЪО	ро				
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	PO₁									9	PO ₁₀	PO ₁₁	PO ₁				
Outcom	es PO ₁	PO ₂								9	PO ₁₀	PO ₁₁	PO				
Outcom CO ₁	es PO ₁	PO ₂	PO ₃		PO ₅					9	PO ₁₀	PO ₁₁	PO				
Outcom CO ₁ CO ₂	es PO ₁	PO ₂	PO ₃	PO ₄	PO ₅					9	PO ₁₀	PO ₁₁	PO				
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- 22. Write a program to generate random numbers sequence in Java.
- 23. Write a program to swap the numbers without using third variable in Java.
- 24. Write a Java Program to find the sum and product of digits of a given number.
- 25. Write a Java Program to display multiplication of an array.

26. Write a java program to perform arithmetical operations using BigInteger class.

Examination and Evaluation Pattern: It include both internal evaluation (50 marks) comprising two class sessional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (50 marks) which is mainly end semester examination.

Text Books:

1	Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2	Elements of Werlichen Technology (Velume 1), Heire Chaudhury

2 Elements of Workshop Technology (Volume - 1): Hajra Choudhury.
 3 Workshop Manual / Venkat Reddy / BS Publications / Sixth Edition.

3	Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition.					
Refe	Reference Books:					
1	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop					
	Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.					
2	Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition,					
	Pearson Education India Edition, 2002.					
3	Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.					
4	Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.					

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PO ₁ - Enginee investigations sustainability, PO ₁₂ - Life-lon Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Con Unit: Unit: 2	Databas Analyze visualiz ring Knc of compl POs - Ethi g Learnin PO1 2 I I	ses the da ation wledge, ex probl ics, PO ₉ - g PO 2 2 2 PO 2 2 Introd science Data of APIs, 1 source Introd Chara Data, Archit Techn Ecosy for Ha PIG. M Data a Centra	PO ₂ - 1 ems, PO Individu PO ₃ PO ₃ 2 2 2 2 2 2 1 - 1 2 2 2 2 2 2 1 - 1 2 2 2 2 2 2 1 - 1 2 2 2 2 2 2 2 2 2 1 - 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Problem ps- Mode al or tea of cours PO4 1 1 1 Reasona to core ess, data on and n ng and to Big cs - Vol of ana - space 1 appro- bistribut Hadoop uce Fra : Introo lencies	analysi ern tool i m work, se outco PO ₅ 2 2 able; 2 - 2 e conce a science nanage: fixing d Data: I ume, Ve lytical e e of Big baches ted File 0 Distrib amewor duction, and o	s, PO ₃ - usage, PO PO ₁₀ - Cor Domes wit PO ₆ Signific	Design/de 6- The eng nmunication h program PO7 PO7 ant; 3 – Si technolog Types of roduction storage a - Definit ariety and , State of ansactions ential use basics, Ad e System of uction to	velopmen ineer and on, PO ₁₁ - F n outcom PO ₈ trong gies: Intr data, Exa a, Source and mana ion, ove other Va f the Pra s, Interace e cases vantages (HDFS), (Machine conceptiance, I	t of so society Project n nes PO 9 1 1 oduction mple a s of dat agement rview of s, Issues actice i ctions, 0 for Big s of Hao Overvie Learni ts, Intr Distribu	PO10 PO110 PO10 PO10 PO10 PO10 PO10 PO10	PO4 nvircent a PC PC ninco ons colle ; mu Data, aller tics, tion The iery 3ase n to cope	- Cconnee nnd fii Dn Dn logy ectio ltiple s; Big s; Sit s;	PO12 PO12 PO12 , data on and e data g Data g data adoop guages re and tistics, s and

		Columnar Databases, Failover and reliability principles, working mechanisms of					
		NoSQL Databases – HBase, Cassandra, Couch DB, Mango DB.					
		Applications of Data Science, Technologies for visualization, recent trends in various					
	Unit: 5	data collection and analysis techniques, various visualization techniques, application					
		development methods in data science using g R, Spreadsheet-like analytics.					
Examination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class							
sessional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which							
is mainly end semester examination.							
Text	t Books:						
1	Dinesh Kumar, Business Analytics, Wiley India Business analytics: The Science						
2	V.K. Jain, Data Science & Analytics, Khanna Book Publishing, New Delhi o						
Reference Books:							
1	Data Science for Dummies by Lillian Pierson, Jake Porway						
2	Doing Data Sci	Doing Data Science by Cathy O'Neil, Rachel Schutt Released October 2013 Publisher(s): O'Reilly					
	Media, Inc						

Course C					Course					ture	s	emester:
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Version: 1.2					r oval: 16	th BoS 1	7-11-2022	_	U	1 0		
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Periods		: 4							nal Eval		:	30
	Credits	: 4	4						End Ser		:	70
Instruction			ture	ioa				Ľ	lxam Dı	iration	:	3 Hrs.
Prerequisite Course Obje	、 ,	ete Ma	unemat	ics								
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CO ₄		and ana				and to d	istinguisł	ı betwee	n	Р	O3, I	PO ₄ , PO ₅
PO ₁₂ - Life-long Course	PO ₁		pping o	of cours	se outco PO₅	omes wit	h progran PO 7	n outcon PO ₈	nes PO ₉	PO ₁₀	PC	D ₁₁ PO ₁
Outcomes		-	FU3	FU4	FU5	PU ₆	FO 7	PO ₈	FU9	FO ₁₀	F	FU ₁₁
CO ₁	2	2										
CO_2			2	1								
CO ₃		2	2	1								
CO ₄			2	1	1							
			1 - 1	Reason	able; 2 –	Signific	ant; 3 – S	trong				
Detailed Cor	itents.	Funda	mental	s: Strii	ngs, Alp	habet l	·	0	ions F	inite s	tate	machine
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		Automata Duch down automata definition model accontance of CEL Accontance						
		Automata: Push down automata, definition, model, acceptance of CFL, Acceptance						
		by final state and acceptance by empty state and its equivalence. Equivalence of CFL						
		and PDA, interconversion.						
		Turing Machine: Turing Machine, definition, model, design of TM, Computable						
	Unit: 4	functions, recursively enumerable languages. Church's hypothesis, counter						
	machine, types of Turing machines							
		Computability Theory: Chomsky hierarchy of languages, linear bounded automata						
	Unit: 5	and context sensitive language, LR(0) grammar, decidability of problems, Universal						
	Unit. 5	Turing Machine, undecidability of posts correspondence problem, Definition of P						
		and NP problems, NP complete and NP hard problems						
Exa	nination and Eva	aluation Pattern: It include both internal evaluation (30 marks) comprising two class						
sess	ional exams/ ass	ignments/quiz/seminar presentation etc. and external evaluation (70 marks) which						
is m	ainly end semest	er examination.						
Text	Books:							
1	Introduction to	o Automata Theory Languages and Computation. Hopcroft H.E. and Ullman J.						
	D. Pearson Edu	cation						
2	Theory of C	omputer Science – Automata languages and computation -Mishra and						
	Chandrashekar							
Refe	rence Books:							
1	Introduction to	Formal languages Automata Theory and Computation Kamala Krithivasan Rama R.						
2	Michael Sipser,	"Introduction to the Theory of Computation ",Thomson Learning, PWS publishing						
	company							
3	Introduction to	Computer Theory, Daniel I.A. Cohen, John Wiley.						
<u> </u>								

	ode	Course Title Lecture Seme								ostori				
MMCA313	PCT			Block	chain T	echnolog	gy		L	Г Р		ester: II		
Version: 1.2					oval: 16	th BoS 17	7-11-2022		Ŭ.	1 0		11		
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		e functional/operational aspects of cryptocurrency ecosystem. about wallets and learn their utilization of wallet during transac												
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CO ₃	Develop	the us	e cases	on Hyp	erledge	er.					D ₃ , PO ₄ ,			
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PO ₁ - Enginee investigations														
sustainability,														
PO12- Life-lon					,	- 10		,	J			,		
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CO ₁	2	2	-											
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Detailed Cor	tonta		1-1	keasona	ibie; 2 –	Signific	ant; 3 – S	trong						
Detailed Col	itents:	Introd	uction	to Cru	ntograr	by Intr	oduction	to grap	h ring	and fie	ld prin	an and		
							thmetic, l				-			
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		J .	L /				Algorithm, RSA algorithm, Diffie-Hellman key exchange algorithm, ElGamal Encryption, Elliptic curve cryptography, SHA 256, Digital Signature, Zero							
		Know	ledge P	Knowledge Proof (ZKP) Introduction from barter system to Cryptocurrency, fundamental of Blockchain,										
						ystem to					of Bloc	kchain,		
		Introd Block	luction struct	from b ure, C	arter sy Genesis	Block,	Cryptoc Orphaneo	urrency. 1 Blocks	fundar , Stale	nental o Block,	Uncle	Block,		
Unit: 2	,	Introd Block Distril	luction struct outed	from b ure, C Ledger	arter sy Genesis Techn	Block, ology (I	OCryptoc Orphaneo DLT), pee	urrency d Blocks er-to- p	fundar , Stale eer ne	nental o Block, twork,	Uncle Merkle	Block, Tree,		
Unit: 2	2	Introd Block Distril Lifecy	luction struct outed cle of 1	from b ure, C Ledger Blockch	arter sy Genesis Techn ain, Eve	Block, ology (I olutions	Cryptoc Orphaned DLT), pee of Blockd	urrency, d Blocks er-to- p chain, Fo	fundar , Stale eer ne ork, dou	nental o Block, twork, ble spe	Uncle Merkle nding 1	Block, Tree, noney,		
Unit: 2	2	Introd Block Distril Lifecy Trans	luction struct outed cle of 1 actions	from b ure, C Ledger Blockch	arter sy Genesis Techn ain, Eve	Block, ology (I olutions	OCryptoc Orphaneo DLT), pee	urrency, d Blocks er-to- p chain, Fo	fundar , Stale eer ne ork, dou	nental o Block, twork, ble spe	Uncle Merkle nding 1	Block, Tree, noney,		
Unit: 2	2	Introd Block Distril Lifecy Transa Blockd	luction struct outed cle of I actions chain.	from b ure, C Ledger Blockch and U	arter sy Genesis Techn ain, Evo TXO's, '	Block, ology (I olutions Types of	Cryptoc Orphaneo DLT), pee of Blocko f Blockch	urrency, 1 Blocks er-to- p chain, Fo ain. Nee	fundar , Stale eer ne ork, dou d of Bl	nental o Block, twork, ble spe ockchai	Uncle Merkle nding 1 n, Bene	Block, Tree, noney, efits of		
Unit: 2	2	Introd Block Distril Lifecy Transa Blockd Crypte	luction struct outed cle of l actions chain.	from b ure, C Ledger Blockch and U ncies: B	arter sy Genesis Techn ain, Evo TXO's, '	Block, ology (I olutions Types of	Cryptoc Orphaned DLT), pee of Blockd	urrency, 1 Blocks er-to- p chain, Fo ain. Nee	fundar , Stale eer ne ork, dou d of Bl	nental o Block, twork, ble spe ockchai	Uncle Merkle nding 1 n, Bene	Block, Tree, noney, efits of		
Unit: 2	2	Introd Block Distril Lifecy Trans Blockd Crypte Bitcoi	luction struct outed cle of l actions chain. ocurrer n Cash	from b ure, C Ledger Blockch and U ncies: B (BCH),	arter sy Genesis Techn ain, Evo TXO's, ' itCoin	Block, ology (I olutions Types of (BTC), E	 Cryptoc Orphaneo DLT), pee of Blockof Blockch thereum 	urrency, d Blocks er-to- p chain, Fo ain. Nee (ETH), F	fundar , Stale eer ne ork, dou od of Bl Ripple (2	nental o Block, twork, ble spe ockchai XRP), Li	Uncle Merkle nding 1 n, Bene teCoin	Block, Tree, noney, efits of (LTC),		
Unit: 2 Unit: 3		Introd Block Distril Lifecy Trans Block Crypte Bitcoi Minin	luction struct outed cle of 1 actions chain. ocurrer n Cash g pools	from b ure, C Ledger Blockch and U' ncies: B (BCH), , Minin	arter sy Genesis Techn ain, Evo TXO's, ' itCoin (g, Diffic	Block, ology (I olutions Types of (BTC), E culty Lev	• Cryptoc Orphaneo DLT), pee of Blocko f Blockoh thereum vel, Curre	urrency, d Blocks er-to- p chain, Fo ain. Nee (ETH), F	fundar eer ne ork, dou d of Bl Ripple (2 et, Non	nental o Block, twork, ble spe ockchai XRP), Li ce, how	Uncle Merkle nding 1 n, Bene teCoin	Block, Tree, noney, efits of (LTC), s picks		
		Introd Block Distril Lifecy Transa Blocko Crypto Bitcoi Minin transa	luction struct outed cle of J actions chain. ocurrer n Cash g pools .ctions,	from b ure, C Ledger Blockch and U' ncies: B (BCH), , Minin How d	arter sy Genesis Techna ain, Evo TXO's, ' itCoin (g, Diffic o memp	Block, ology (I olutions Types of (BTC), E culty Lev pools wo	• Cryptoc Orphaneo DLT), pee of Blockch f Blockch thereum rel, Curre rk, 51% a	urrency, d Blocks er-to- p chain, Fo ain. Nee (ETH), F ent Targe ttack.Co	fundar , Stale eer ne ork, dou d of Bl Ripple (. et, None	nental o Block, twork, ble spe ockchai XRP), Li XRP), Li ce, how	Uncle Merkle nding 1 n, Bene teCoin miners hms: P	Block, Tree, noney, efits of (LTC), s picks roof of		
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		Introd Block Distril Lifecy Trans Blocka Crypt Bitcoi Minin transa Work model	uction struct outed cle of J actions chain. ocurrer n Cash g pools ctions, (PoW) s (PoW	from b ure, C Ledger Blockch and U' ncies: B (BCH), , Minin How d), Async / + PoS)	arter sy Genesis Techna ain, Evo TXO's, ' itCoin o g, Diffio o memp chronou	Block, ology (I olutions Types of (BTC), E (BTC), E culty Lev pools wo s Byzan	Cryptoc Orphaneo DLT), pee of Blockch f Blockch thereum rel, Curre rk, 51% a tine Agre	urrency, d Blocks er-to- p chain, Fo ain. Nee (ETH), F ent Targe ttack.Co sement,	fundar , Stale eer ne ork, dou d of Bl Ripple (. et, None nsensus Proof o	nental o Block, twork, ble spe ockchai xRP), Li ce, how s Algorit f Stake	Uncle Merkle nding 1 n, Bene teCoin miners hms: P	Block, Tree, noney, efits of (LTC), s picks roof of		
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	Unit: 5	Hyperledger- Introduction to Hyperledger, Utilization of Hyperledger, Hyperledger Architecture, Membership, Blockchain, Transaction, Chaincode, Hyperledger Fabric, Features of Hyperledger, Fabric Installation of prerequisite, Architecture of Hyperledger Fabric, Transaction, Ledger, Nodes, Peer, Endorser,
.		Ordering Nodes, Channels, Certificate Authority, Transaction Flow.
		aluation Pattern: It include both internal evaluation (30 marks) comprising two class
		ignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semest	er examination.
Text	t Books:	
1	Mastering Block	chain, Imran Bashir, Packt Publishing
2	Bitcoin and O	Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward
	Felten,Andrew	Miller, Steven Goldfeder, Princeton University Press.
	https://bitcoin	book.cs.princeton.edu/
Refe	erence Books:	
1	Grokking Bitcoi	n, Kalle Rosenbaum, Manning Publications.
2	Blockchain Basi	cs, Daniel Drescher, Apress Publication

	Course Code				Course Title						Semester:	
MMCA314	PCT					earning				Г Р	Jen	III
Version: 1.2	<u>a 1</u>				:oval: 16	th BoS 1	7-11-2022		-	1 0		
N	Scheme			1			Se	cheme of			10	0
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Instructio			ture						Lind Se			Hrs.
Prerequisite				0				E		liation	. J	1115.
Course Obje			ingene	C .								
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Course Outc COs No.	omes (Co	0):			Staten	nent						rogram
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CO_2	Apply m differen			g techn	iques to	o addres	s the real 1	time pro	blems i	n	PO 3, 1	PO ₅
CO ₃							d model s				PO ₃ , 1	
CO ₄	Analyze Learnin			ate the	e applio	cations	which ca	n use l	Machin	e P	O ₂ , PO	4, PO 5
Course Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	h progran PO 7	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO ₁	2	2										
CO ₂			2		2							
CO ₃			2	1								
CO ₄		2		1	2							
			1 – 1	Reasona	ıble; 2 –	Signific	ant; 3 – St	rong	•	•		
Detailed Cor	ntents:											
Unit: 1	1	applic teleco data, super	ations mmuni concep	of macl cation, ot repro emi su	hine lea and so esentati	rning in on. Aspe on, fun	ng - Def different cts of dev ction app ervised le	fields s eloping roximat	uch as a learn ion, A	health o ing syst general	care, t em: : over	banking, training view of
Unit: 2	2	Basics identi Pytho Sublin Contr Contr Lambo	fiers, c fiers, c n, Ope ne, pycl ol stru nue, In da func	r thon: ommen rators, narm, sj a cture troduct tions, F	ts, inde Standa pyder a: and fu ion to ile Hand	entation rd Inpu nd releva nction: function <u>fling, pa</u>	Python, and state t and Ou ant packag if-elif-els n, Types ckages an	ements, atput, In ges insta e, while of func <u>d module</u>	Variabl troduc llations loop, tions, es.	es and tion to such a for loo Functio	data t IDE s nacone p, bre n arg	ypes in such as da. eak and uments
Unit: 3	3	opera and re librari	tion, Ar elated o es for i	ray and operation mpleme	its oper ons usin enting N	ration, M ng pytho Machine	les, Dictio atrix and n. Unders Learning	associate stand the models.	ed oper e advan Types c	ations, l tage of of data s	Linear using ets.	algebra Pythor
Unit: 4	1	Panda files,	i s data pandas	frame dataf	and dat rames,	t a frame Explora	related at tory dat sing value	o peratio a analy	ns on c sis, Da	lataset: ita pre	Readi parati	on and

		performance measure), Data visualization on dataset using matplotlib and seaborn libraries: Scatter plot, Line plot, Bar plot, Histogram, Box plot, Pair plot.
	Unit: 5	Introduction to Regression - Linear, Non-linear, Simple and Multiple regression, and their applications, Introduction to Classification technique - KNN, ANN, Decision Trees and SVM. Pros and cons of each method, and different classification accuracy metrics. Introduction to clustering approaches - Types of clustering, including Partitioned-based Clustering, Hierarchical Clustering, and Density-based Clustering.
		iluation Pattern: It include both internal evaluation (30 marks) comprising two class ignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
	ainly end semest	
Text	Books:	
1	Mastering Pythe	on for data science, Samir Madhavan
2	Introduction to	Machine Learning with Python, Andreas C. Mueller
Refe	rence Books:	
1	Machine Learni	ng using Python, U Dinesh Kumar Manaranjan Pradhan

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Course Code					Course				1 1	ectu	1	Sen	nester:
MMCA360PCF	2		Data		ta Scier		7 11 0000		L	T	P		III
Version: 1.2		of Imate	Date of ruction		oval: 16	th Bos L	7-11-2022	cheme of	0	0	4		
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Instruction Me		• –	ctical						lxam				Hrs.
Prerequisite(s): N				atistics				L	Aum	Dur		. 0	1113.
Course Objective		linacies	und be	atistics									
1. To understar		e pytho	n librar	ies, bas	ic Stati	stical me	asures fo	r data sc	ience				
 To learn descriptive analytics on the benchmark data sets. To apply correlation and regression analytics on standard data sets. 													
4. To present a													
Course Outcome	es (CC)):		Ŭ		•							
COs No.		/			Statem	nent					Мар	ped P	rogram
													s (POs)
CO1 Ma	ike us	e of the	e pytho	n librar	ies, bas	ic Statist	ical meas	ures for	data			PO ₁ , F	O ₂
sci	ence.												
CO ₂ Per	rform	descri	ptive ar	nalytics	on the	benchma	ark data s	ets.			PC)3, PO	4, PO 5
CO ₃ Per	rform	correl	ation ar	nd regre	ession a	nalytics	on standa	ard data :	sets.		PC) ₃ , PO ₃	5, PO 9
CO ₄ Pre	esent	and int	erpret	data us	ing visu	alization	package	s in Pyth	on.		PC) ₄ , PO	5, PO 9
PO ₁ - Engineering													
investigations of co													
sustainability, PO ₈ -			Individua	al or tear	n work, I	PO 10- Con	nmunicatic	on, PO 11- P	roject	man	ageme	ent and	finance,
PO12- Life-long Lea	irning		nningo	fooura	t	mogwith		outoom					
Courses		Ma	pping o	of cours	e outco	mes witt	n progran		ies				
Course I	PO ₁	PO_2	PO ₃	PO_4	PO ₅	PO ₆	PO ₇	PO ₈	PO	9	PO ₁₀	PO ₁₁	PO ₁₂
Outcomes	2	2											
	Ζ	Z	2	1	2								
			2	1	2				1				
CO ₃ CO ₄			2	1	2				1				
			1 1	-	-	<u>Ciamifia</u>			1				
Detailed Content	ta		I - K	leusonu	<i>Die</i> , 2 –	Significi	ınt; 3 – St	long					
1. Download, in		and or	zploro t	ho foot	uros of	f Num Du	SoiDy I	uputor	States	mod	ola or	d Dor	dag
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2. Working wit	h Mu	mny ar	rave										
3. Working wit				neg									
4. Reading data					the w	eh and e	voloring	various	com	man	ds for	doine	J
descriptive a										man	us 101	uom	5
5. Use the diab										perf	ormi	ng the	
following:										1 -		0	
a. Univariate	e anal	vsis: Fi	requen	cy, Mea	an, Med	lian, Moo	de, Variai	nce, Star	ndard	l De	viatio	n, Ske	wness
and Kurtosis		5	1	5,	,	,	,	,				,	
b. Bivariate a	analy	sis: Lin	ear and	l logisti	ic regre	ession m	odeling						
c. Multiple R				0	U		U						
d. Also comp					ve anal	ysis for	the two o	lata sets					
6. Apply and ex													
a. Normal cu	-												
b. Density ar													
c. Correlatio		d scatte	er plots	5									
d. Histograms													
					e. Three-dimensional plotting								
e. Three-din	nensi												
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e. Three-din 7. Visualizing C Examination and	nensi Geogi 1 Eva l	raphic l	Data wi	n: It inc	lude bo								
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e. Three-din 7. Visualizing C Examination and	nensi Geogr 1 Eva l ⁄ assiş	raphic l l uation gnment	Data wi Patter ts/ quiz	n: It inc z/ semi	lude bo								

1	Dinesh Kumar, Business Analytics, Wiley IndiaBusinenalytics: The Science
2	V.K. Jain, Data Science & Analytics, Khanna Book Publishing, New Delhi o
Refe	erence Books:
1	Data Science For Dummies by Lillian Pierson , Jake Porway
2	Doing Data Science by Cathy O'Neil, Rachel Schutt Released October 2013 Publisher(s): O'Reilly
	Media, Inc

Course C	ode				Course '				Le	cture		Seme	ester:
MMCA361	PCP		Blockchain Technology LabLDate of Approval: 16th BoS 17-11-20220										II
Version: 1.2		L			:oval: 16	th BoS 17		_	0	0 4		1	
	Scheme			1			Sc	heme of			1		
	Periods		Hrs.							<u>n Score</u>	:		-
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Prerequisite				CS				E2		uration	•	51	115.
Course Object			incinati	105									
 To learn To under To demo To apply Course Outcome 	stand th nstrate t and anal	e conce he Cryp yze the	ept of Bl ptocurre	lockcha encies.	in.		Node.js, (Ganache	, MyE1	therWa	llet.		
COs No.	,	<u>, , , , , , , , , , , , , , , , , , , </u>			Statem	ent				Ma	ppe	ed Pro	gram
												mes	· /
CO1	Unders ecosyst		e functi	ional or	operati	onal asp	ects of cr	yptocuri	rency	P	O ₁ ,	PO ₂ , 1	PO8
CO ₂	Demon Techno		he eme	rging al	ostract r	nodels fo	or Blockel	nain				PO ₃	
CO ₃			rith Wel	b Wallet	ts, Mobi	le Wallet	s, Deskto	p Wallet	s,		PC	D6, PC) ₈
-	Paper V	vallets.											
CO ₄ PO ₁ - Engineer investigations sustainability, I	Apply B ICO, etc ing Know	lockcha c. wledge, ex proble	PO2- P ems, PO	Problem 5- Mode	analysis rn tool u	, PO 3- D sage, PO 6	- The engi	elopmen neer and	t of s societ	olutions y, PO 7- I	P Envi	O₄− C	onduct
CO ₄ PO ₁ - Engineer investigations sustainability, J PO ₁₂ - Life-long	Apply B ICO, etc ing Know of comple PO 8- Ethic	lockcha c. wledge, ex proble cs, PO 9- l	PO ₂ - P ems, PO Individu: pping c	Problem 5- Modei al or teai	analysis rn tool u m work, F	, PO 3- D sage, PO 6 PO 10- Com	esign/dev - The engi	relopmen neer and n, PO 11- P	t of s societ	olutions y, PO 7- I	P Envi	O₄− C	ent and
CO ₄ PO ₁ - Engineer investigations sustainability, I	Apply B ICO, etc ing Know of comple PO 8- Ethic	lockcha c. wledge, ex proble cs, PO 9- I	PO 2- P ems, PO 3 Individua	Problem 5- Modei al or teai	analysis rn tool u m work, F	, PO 3- D sage, PO 6 PO 10- Com	esign/dev - The engi municatio	relopmen neer and n, PO 11- P	t of s societ	olutions y, PO 7- I	P Envi nen	O₄− C	onduct ent and
CO ₄ PO ₁ - Engineer investigations sustainability, I PO ₁₂ - Life-long Course	Apply B ICO, etc ing Kno of comple PO ₈ - Ethic Learning	lockcha c. wledge, ex proble cs, PO 9- 1 g Ma	PO ₂ - P ems, PO Individu: pping c	Problem 5- Moder al or tear of cours	analysis rn tool u m work, F e outcor	, PO 3- D sage, PO 6 PO 10- Com mes with	Design/dev - The engi municatio	relopmen neer and n, PO 11- P outcom	t of s society rojection	olutions y, PO 7- I nanagen	P Envi nen	O ₄ - C ironmo t and f	conduct ent and inance,
CO ₄ PO ₁ - Engineer investigations sustainability, I PO ₁₂ - Life-long Course Outcomes	Apply B ICO, etc ing Know of comple PO ₈ - Ethic Learning PO ₁	lockcha c. wledge, ex proble cs, PO ₉ -1 g Ma PO ₂	PO ₂ - P ems, PO Individu: pping c	Problem 5- Moder al or tear of cours	analysis rn tool u m work, F e outcor	, PO 3- D sage, PO 6 PO 10- Com mes with	Design/dev - The engi municatio	relopmen neer and n, PO₁₁- P a outcom PO ₈	t of s society rojection	olutions y, PO 7- I nanagen	P Envi nen	O ₄ - C ironmo t and f	conduct ent and inance,
CO ₄ PO ₁ - Engineer investigations sustainability, I PO ₁₂ - Life-long Course Outcomes CO ₁	Apply B ICO, etc ing Know of comple PO ₈ - Ethic Learning PO ₁	lockcha c. wledge, ex proble cs, PO ₉ -1 g Ma PO ₂	PO ₂ - P ems, PO Individua pping o PO ₃	Problem 5- Moder al or tear of cours	analysis rn tool u m work, F e outcor	, PO 3- D sage, PO 6 PO 10- Com mes with	Design/dev - The engi municatio	relopmen neer and n, PO₁₁- P a outcom PO ₈	t of s society rojection	olutions y, PO 7- I nanagen	P Envi nen	O ₄ - C ironmo t and f	conduct ent and inance,
CO ₄ PO ₁ - Engineer investigations sustainability, I PO ₁₂ - Life-long Course Outcomes CO ₁ CO ₂	Apply B ICO, etc ing Know of comple PO ₈ - Ethic Learning PO ₁	lockcha c. wledge, ex proble cs, PO ₉ -1 g Ma PO ₂	PO ₂ - P ems, PO Individua pping o PO ₃	Problem 5- Moder al or tear of cours	analysis rn tool u m work, F e outcor	PO ₃ - D sage, PO ₆ PO ₁₀ - Com mes with PO ₆	Design/dev - The engi municatio	relopmen neer and n, PO₁₁- P a outcom PO₈ 2	t of s society rojection	olutions y, PO 7- I nanagen	P Envi nen	O ₄ - C ironmo t and f	conduct ent and inance,
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CO ₄ PO ₁ - Engineer investigations sustainability, I PO ₁₂ - Life-long COurse Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Con 1. Crea 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 2. Crea 3. Crea hado 4. Supp 5. Votin 6. Hand	Apply B ICO, etc ing Know of complete Os- Ethio Learning POs- Ethio Learning POs- Ethio Complete Os- Ethio POs- Ethio POs- Ethio POs- Ethio Create n I.1.1 Struct Create n I.1.1	lockcha c. wiedge, ex proble cs, PO ₉ - 1 <u>F</u> PO ₂ 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO ₂ - P ems, PO Individua pping c PO ₃ 2 2 2 2 1 - F cks and f a bloch hain action ode to th ain before s of of Wc ency cracts ilator, s contrac act ardwar	Problem 	analysis. rn tool u m work, F e outcor PO ₅ ble ; 2 – 2 the chai t, Timest rork sion chai sensus rallets Wallets,	, PO ₃ - D sage, PO ₆ PO ₁₀ - Com mes with PO ₆ 2 Significa n camp, Tra	Pesign/dev - The engi municatio program PO ₇ nt; 3 – St	relopmen neer and n, PO ₁₁ - P outcom PO ₈ 2 2 rong	t of s societ; rojectr nes PO ₉ 1	evious		O ₄ - Co ironme t and f PO ₁₁	PO ₁₂

9. Hands-on Relictum Pro Blockchain 5.0 Platform, Blockchain Security 2Go starter kit

Examination and Evaluation Pattern: It include both internal evaluation (50 marks) comprising two class sessional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (50 marks) which is mainly end semester examination.

Text Books:

1 Hands-on Blockchain for Python Developers, Arjuna Sky Kok, Packt Publication

2 Solidity Programming Essentials, Ritesh Modi, Packt Publication

Reference Books:

1 Ethereum for Web Developers, Santiago Palladino, Apress Publication.

2 Learn Blockchain Programming with JavaScript, Eric Traub, Packt Publication

Course C	ode	Course Code Cours							Lecture					
MMCA470						ajor Proje	ect		L	Т	P	Sei	Semester:	
Version: 1.2			Date				7-11-2022		0	0	32		IV	
	Scheme	of Inst						heme of	f Exar	nina	ation			
No. of	Periods	: 40	Hrs.					Ма	ximu	n So	core	:	400	
Lab Hours	/ Week	: 40					Internal Evaluation : 200						200	
	Credits	: 16				End Semester : 20					200			
Instructio	n Mode	: Pr	actical					Eх	kam E	oura	tion	:	-	
Prerequisite		are Eng	gineerin	ıg and I	Program	ming La	nguage							
Course Objec														
1. To underst														
2. To familiar									any p	rogr	amm	ing la	nguages	
3. To apply E					gning th	e softwa	re applica	ation.						
4. To implem		1	l proble	ems.										
Course Outc	omes (CC	D):												
COs No.					Statem	ent					-	-	Program	
													es (POs)	
CO ₁	Applyin	g SRS, t	echniqu	les							PO		PO ₈ , PO ₉ ,	
CO ₂	Apply D	locian n	athoda	for give	on CDC						DΟ	PC ₂ PO₅	P11 PO9, PO11	
CO ₂ CO ₃						ned Frar	nourorla				10	PO ₃ , PO ₅ , PO	,	
CO ₃ CO ₄							ftware so	lution			PO		PO ₉ , PO ₁₁ ,	
CO_4	Able to	impien	entrea	i woriu	problei	n nito so	itware so	nution			r0.	PC		
Course	DO						n program				20	DO	БО	
Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	POg	ł	PO ₁₀	PO	1 PO 12	
CO ₁		2	2					2	2			2		
CO_2			2		2				2			2		
CO ₃			2		2									
CO_4			2		2				2			2	2	
	1 – Reasonable; 2 – Significant; 3 – Strong													
			1 – R	leasona	ble; 2 –	Significa	nt; 3 – St	rong						
Detailed Con	tents:		1 – R	leasona	ble; 2 –	Significa	nt; 3 – St	rong						
Detailed Con Base	tents: ed on real	l-time/					nt; 3 – St	rong						
 Base 	ed on real	·	in-hou	se/ pro	oblem sj	pecific			mark	s) co	ompri	singt	wo class	
 Base Examination 	ed on real and Eval	uation	in-hou Patterr	se/ pro n: It incl	oblem sj lude bot	pecific h intern	al evaluat	ion (200						
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Discipline Specific Elective

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	of Peri			Hrs.						aximun				00
Perio	ods/W		: 4							nal Eval				0
		dits	: 3							End Se				0
Instruc				cture	1 1.1				E	xam Dı	iratio	1	: 3	Hrs.
Prerequisi			structu	re and A	algorith	m								
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Course Ou				u appire	acions.									
COs No.		.5 (00	·			Statem	ent				м	anr	ed P	rogram
005110.						Station								s (POs)
CO ₁	Un	nderst	and the	e hardw	are and	l softwa	re comp	onents re	esponsi	ble for			PO ₁ , P	<u> </u>
•			eviden				· · · · 1		-1				,	
CO ₂		0			vbercri	me inve	estigation	n.				PO	2, PO 4	, PO ₈
CO ₃							0	s used for	r collec	ting			PO4, P	
		idenc			8		1.			8			,	
CO ₄	An	alyze	and ap	ply the	eviden	e throu	ıgh suita	ble tools.				F	PO ₂ , P	O 3
PO1- Engin	eering	Know	vledge,	PO ₂ - Pr	oblem	analysis,	PO ₃ - D	esign/dev	elopmei	nt of se	olution	s, F	PO ₄ - (Conduct
investigation														
sustainabilit			s, PO 9- li	ndividua	l or tean	n work, P	O 10 ⁻ Com	municatio	n, PO 11-	Project r	nanage	emer	nt and	finance,
PO ₁₂ - Life-lo	ong Lea	irning												
			Mar	ning of	COURSE	outcor	nes with	nrogram	outcor	nec				
Course			•					program						
Course Outcome		PO ₁	Mar PO ₂	oping of PO 3	f course PO ₄	e outcor PO ₅	nes with PO 6	program PO ₇	outcor PO ₈	nes PO ₉	PO ₁	D	PO ₁₁	PO ₁₂
Course Outcome CO ₁		PO ₁	PO ₂								PO	D	PO ₁₁	PO ₁₂
Outcome			•						PO ₈		PO ₁₀	D	PO ₁₁	PO ₁₂
Outcome CO ₁			PO ₂		PO ₄						PO ₁₀	0	PO ₁₁	PO ₁₂
Outcome CO ₁ CO ₂			PO ₂		PO ₄				PO ₈		PO ₁₀	0	PO ₁₁	PO ₁₂
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Outcome CO ₁ CO ₂ CO ₃		2	PO ₂ 2 2	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈		PO	0	PO ₁₁	PO ₁₂
Outcome CO ₁ CO ₂ CO ₃ CO ₄	Content	2	PO ₂ 2 2 DIGIT Evider Analys	PO ₃ 2 1 - R AL FOI nce, Dig sis, Pres	PO ₄ 1 easonal RENSIC gital Fo	PO ₅ ble; 2 - S CS PRO prensices on Phase	PO ₆ Significa CESS: F s Proces es. Cyber	PO ₇ nt; 3 – St Forensic ss – Iden r Crime I	PO ₈ 2 2 rong Science tificatie aw- In	PO ₉ e, Digit on, Col ternatio	tal Fo lectio	oren n, H egal	isics, Exami 1 Fran	Digital ination, nework
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Outcome CO1 CO2 CO3 CO4 Detailed C	es	2	PO ₂ 2 2 DIGIT Evider Analys of Cyl Evider FORE Device	PO ₃ 2 1 - R AL FOI ace, Dia sis, Pres percrim ace. NSICS I es, Oper	PO ₄ 1 easonal RENSIC gital Fo sentatic e Law, ENVIRC rating S	PO5 Dle; 2 – S S PRO prensics Digital Digital	PO ₆ Significa CESS: F s Proces es. Cyber Crime, TS: Hard File Syst	PO ₇ nt; 3 – Str Forensic s – Iden r Crime I Investiga Iware and tems, and	PO ₈ 2 2 rong Science tificatie aw- In tion Metad	PO ₉ e, Digiton, Col ternatic ethods are Env ata, Loo	tal Fo lectio onal L for C vironn cating	oren n, H egal olle	sics, Exami 1 Fran cting ts – S	Digital ination, nework Digital Storage e in file
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	nination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	ional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semester examination.
Text	Books:
1	Richard Boddington, Practical Digital Forensics, PACKT publishing, First Edition, 2016ANDRÉ ÅRNES.
2	Practical Mobile Forensics, PACKT publishing, 2014 Satish Bommisetty, Rohit Tamma, Heather
	Mahalik
Refe	rence Books:
1	"Guide to Computer Forensics and Investigations" 4e, Nelson, Phillips Enfinger, Steuart, Cengage
	Learning.
2	Android Forensics Investigation, Analysis, and Mobile Security for Google Android, Andrew Hoog,
	John McCash.

Course Co	ode			(Course	Title			Leo	ture			
MMCA212	PET						ngineerin	5	L	T P	Se	nester: II	
Version: 1.2					oval: 16	th BoS 1	7-11-2022		3	1 0			
	Scheme						Sc	heme o			1		
	Periods		Hrs.							Score			
Periods	/ Week Credits	: 4 : 3				Internal Evalua					:	30	
						mester	:	70					
Instruction Mode : Lecture Exam Du Prerequisite(s): Data structure and algorithm									iration		3 Hrs.		
Course Objectives:													
 To understand the idea of decomposing the given problem into Analysis, Desig Testing and Maintenance phases. To provide an idea of using various process models in the software industry circumstances To gain the knowledge of how Analysis, Design, Implementation, To test and maintain processes of a software project. 										-	-		
Course Outco		*			t	<u> </u>							
COs No.	X	/			Statem	ent						Program nes (POs)	
CO1	Decomj Knowle				ject in	various	phases	of a li	fecycle	e. P		O2, PO3, O11	
CO ₂		ments	apply 1	the kno	owledge		dependin iques, an			e	Р	O5, PO6, O11	
CO ₃	Perform Implem			2			like An	alysis,	Desig	n, F	PO ₃ , P	O ₄ , PO ₅	
CO ₄							ses of the	product	t.		PO ₂	, PO ₆	
PO ₁₂ - Life-long Course	Learning PO ₁	Maj PO ₂	oping of PO 3	f course PO ₄	e outcor	nes with PO ₆	program PO ₇	outcom	PO ₉	PO ₁₀	PO ₁₀ PO ₁₁		
Outcomes	-		-	104	103	100	10/	108	109	1 0 10		P11 PO ₁₂	
CO ₁	2	2	2								1		
		2	-		1	1					1		
<u>CO3</u>			2	1	1	1							
CO ₄		2				1							
D (11 1 C)			1 – R	easona	ble; 2 – S	Significa	nt; 3 – St	rong					
Detailed Cont	lents:	Comp Mode Specif	onent a ls and fication for Com	and its Comp for Imp ponent	Elemen oonent olement ts: The I	its, The Service ing a Te Business	Compone s: Conce <u>mperatur</u> Case for	ent Indu pts and e Regula Softwar	stry N d Prir tor So e Com	letapho nciples, ftware ponent	or, Co An <u>Comp</u> s, CO	TS Myths	
Unit: 2and Other LessonsLearnLowfor Component-Based Device						rned in Component-Based Software Development, Role evelopment, Common High Risk Mistakes in Component ering, CBSE Success Factors: Integrating Architecture n.							
Unit: 3		Comp Comp Comp	onent l onents, onent	Infrastr , Comp Infras	uctures onents tructur	: Placing and Co es, an	g Software nnectors: Open	e Compo Catalys Proces	onents sis Tec s for	in Cor hnique Con	ntext, s for	he UML, Business Defining ent-Based	
Unit: 4		Manag Practi Why I	gement cal Reu Require	of CBE se of S ments): Measu Software are imp	Iodels of Modularity and Integration. surement and Metrics for Software Components, re Components, Selecting the Right COTS Softw portant, Build vs. Buy, Software Component Pro The Trouble with Testing Software Compone						Software: t Project	

		Configuration Management and Component Libraries, The Evolution,
		Maintenance and Management of Component-Based Systems
		Component Technologies: Overview of the CORBA Component Model,
	Unit: 5	Transactional COM+ Designing Scalable Applications, The Enterprise JavaBeans
		Component Model, Choosing Between COM+, EJB, and CCM, Software Agents
		as Next Generation Software Components.
		luation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	ional exams/ assig	gnments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semeste	r examination.
Tex	t Books:	
1	Component Soft	ware, Clemens Szyperski, Addison-Wesley Professional; 2 edition, 2002, ISBN-10:
	0201745720, ISBN	N-13: 978-0201745726
Refe	erence Books:	
1	Component-Bas	ed Software Engineering: Putting the Pieces Together by George T. Heinemann and
	William T. Counc	cil, Addison-Wesley Professional, 2001 ISBN 1`0: 0201704854, ISBN- 13:9780201704853

Course C	ode			<u> </u>	ourse T	Title							
MMCA213	PET								L	Т	Р	Sem	ester: II
Version: 1.2				oval: 16t	h BoS 17	-11-2022		3	1	0			
	Scheme						S		of Exan				
	Periods	: 60 : 4			laximur				.00				
Periods	/ Week Credits	Internal Evaluat							30				
			End Se				70						
Instructio			ecture]	Exam D	uratio	n	: :	3 Hrs.
Prerequisite(Course Object	/	erequisi	ite										
1. To under	stand fur								bility of	e dat			
3. To acquir	e the co	ncept o	to maintain the Confidentiality, Integrity and Availability of a accept of various protocols and cryptographic algorithms for threats in the networks.										urity to
4. To analyz	e the em	erging t	echnol	ogies in		oer secur	rity areas	and as	sess the	eir cur	ren	t capa	abilities,
limitation			applicat	1011S.									
COs No.	omes (CO	<u>.</u>			Statem	ient							rogram s (POs)
CO ₁	Unders	tand fur	ndamen	itals of (Cryptog	oranhy ai	nd Cyber	Securi	tv			PO ₁ , 1	· /
CO ₂		about l	how to				dentiality			nd		PO ₃ , 1	
CO ₃	Demon	strate v	various				ographic ts in the			or		PO ₂ , 1	PO 3
CO ₄							echnolog			er		PO ₂ , 1	PO ₄
	security	areas	and as	sess th	eir cur	rent cap	babilities	limita	tions a	nd			
	of complex	al applic /ledge, x proble	PO 2- Pr ms, PO 5-	- Moder	n tool us	sage, PO6.	- The eng	ineer an	d societ	y, PO 7-	• En	vironi	nent and
investigations o sustainability, F PO ₁₂ - Life-long	ing Know of complex PO 8- Ethic	al applic vledge, x proble s, PO 9- Ii	PO₂- Pr ms, PO₅- ndividua	- Moder l or team	n tool us 1 work, P	sage, PO 6- PO 10- Com	- The eng	ineer an on, PO 11-	d societ Project	y, PO 7-	• En	vironi	nent and
PO ₁₂ - Life-long Course	ing Know of complex PO 8- Ethic	al applic vledge, x proble s, PO 9- Ii	PO₂- Pr ms, PO₅- ndividua	- Moder l or team	n tool us 1 work, P	sage, PO 6- PO 10- Com	- The eng	ineer an on, PO 11-	d societ Project	y, PO 7-	· En eme	vironi	nent and l finance,
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Exa	mination and Eval	uation Pattern: It include both internal evaluation (30 marks) comprising two class							
sess	ional exams/ assig	gnments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which							
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Text	t Books:								
1	Cryptography an	d Network Security by Behrouz A. Forouzan, 2nd Edition TMH.							
2	Cryptography an	d Network Security, W. Stallings, Prentice Hall, 5th Edition, 20102.							
Refe	erence Books:								
1	Network Securit	y Essentials, William Stallings, Prentice Hall, 5th Edition, 2013.							
2	Network Security	y and Cryptography, Bernard Menezes, Cengage Publication.							

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3. To analy													
4. To apply			racteri	stics of	tool use	ed for tes	st automa	tion.					
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	Unit: 5	Software Quality: Five Views of Software Quality, McCall's Quality Factors and Criteria, Quality Factors Quality Criteria, Relationship between Quality Factors and Criteria, Quality Metrics, ISO 9126 Quality Characteristics, ISO 9000:2000 Software Quality Standard ISO 9000:2000 Fundamentals, ISO 9001:2000 Requirements Maturity Models: Capability Maturity Model, Test Process Improvement, Testing Maturity Model
Exa	mination and Eval	uation Pattern: It include both internal evaluation (30 marks) comprising two class
		gnments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semeste	r examination.
Text	t Books:	
1	Software Testing	g and Quality Assurance theory and practice by Kshira Sagar Naik and Priyadarshi
	Tripathy.	
Refe	erence Books:	
1	Stephen H.Khan,	Metrics and Models in Software Quality Engineering Pearson Education, India.
2	Shari Lawrence I	Pfleeger,"Software Engineering Theory and Practice Pearson Education ,India

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	comput	ing										
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	concern											<b>PO</b> ₇
CO ₃	Apply s											PO ₅
CO ₄	Handle issues.	the cl	oud co	omputin	ıg, virtı	lalizatio	n, securi	ty, and	privac	y P	O4, P	O5, PO8
							municatio program			nanagem		
PO ₁₂ - Life-long Course Outcomes										PO ₁₀	PO	
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	Unit: 5	Security in the Cloud: Security Overview – Cloud Security Challenges and Risks –Identified cloud security Issues-Categorization of cloud security issues–State of the Art solutions, Integrated Solutions: Amazon as Case study– Cloud computing Security Reference Architecture –Identity and Access Management Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security
		luation Pattern: It include both internal evaluation (30 marks) comprising two class
		gnments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semeste	r examination.
Text	t Books:	
1	Toby Velte, Anth	ony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
2	John W.Rittingh	ouse and James F.Ransome, "Cloud Computing: Implementation, Management, and
	Security", CRC P	ress, 2010.
Refe	erence Books:	
1	Cloud Computin	g" A Practical Approach" Anthony T. Velte, Toby J. Velte, Robert Elsenpeter.
	McGraw-Hill.	
2		ffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel
	Processing to th	e Internet of Things", Morgan Kaufmann Publishers, 2012

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	Credits	: 3				End Semester : 70						
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	detection algorithms, partitioning, FT consensus. Distributed multimedia system: Introduction, characteristics, and resource management stream adaptation
Exar	ination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	onal exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	inly end semester examination.
Text	Books:
1	Jean Dollimore, Tim Kindberg, George Coulouris, Distributed Systems: Concepts and Design, 4th
	Edition, Addison Wesley, 2005
2	A. Taunenbaum, Distributed Systems: Principles and Paradigms
Refe	ence Books:
1	G. Coulouris, J. Dollimore, and T. Kindberg, Distributed Systems: Concepts and Design, Pearson
	Education
2	Sape Mullender : Distributed system, 2nd Edition, Addison Wesley.

Course Code MMCA313PET						Course				1	ture		Sem	ester:
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Three Dimensional Transformation: Three dimensional viewing: Viewing	
coordinates, projections, Visible surface detection methods: Back-face Detection,	
Depth-buffer methods, scan line methods, Depth-sorting methods, BSP - Tree	
Methods, Arc sub division methods, Basic illuminations models - Gourand	
shading phong shading.	

**Examination and Evaluation Pattern:** It include both internal evaluation (30 marks) comprising two class sessional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester examination.

Text Books:

1 Heanry Donald, Pauline Baker M: Computer Graphics, PIH 2nd edn., 1995.

**Reference Books:** 

1 Harrington S: Computer Graphics A Programming Approach 2nd Edn. McGraw Hill,1987.

Course C	ode								Course Title Lect							
MMCA314	PET		Artificial Intelligence L							Т	Р	Semester: III				
Version: 1.2					oval: 161	th BoS 17	-11-2022		3	1	0	1	11			
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<b>PO</b> ₁ - Engineer investigations of sustainability, <b>P</b>	of complex <b>O</b> 8- Ethics	c problei	ms, <b>PO</b> 5-	Moderr	n tool us	age, PO ₆ -	• The engi	neer and	society	, <b>PO</b> 7-	Envi	ironm	ent and			
PO ₁₂ - Life-long	Learning															
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Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 2 Unit: 4 Unit: 5 Examination	2 2 tents: 2 2 4 3 4 5 and Eval	PO2 2 2 2 3 4 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO ₃ 2 1 - Ra duction cial Inte ture of I duction ned sea sarial Sa ledge R Inferen ing, Pro ian Net ine Lea tical lea ing with rn Reco n, Statis onent A hiques - thms. Pattern	PO ₄ 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	PO ₅ le; 2 - S luction e, Appl: ent Agen orch: Se crategies cearch f ntation rst orde ic rease Search f ntation rst orde ic rease Super nodels, n data - n: Intro (PCA) a st Neig	PO ₆ Significations to Artificiations nts. Com earching s, Local for game & Reaso er logic, oning, U vised an learning EM algo oduction ecognitic and Line hbor (NP	PO7 mt; 3 – Str cial Intell of Artific puter visit for solution search all s, Alpha – ning: Prof Resolution tility theorem and unsurg g with con- porthm, Ref n, Design pon, Parama ar Discrific N) Rule, B al evaluat	PO ₈ ong igence, ial Inte on, Natu- cions, U gorithm Beta pr position n, Unific position n, Unific pory, Hide pervised mplete princip eter est ninant A ayes Cla ion (30 n	PO ₉ 1 Found lligence ural La niform s and uning. al logic cation, den M learn data - ment le les of imatio assifier marks)	ations e, Int nguag led se optim c, The Forw arkov ing, Naive earnin patte n met s (LDA c, K-m	s and ellig ge Po arch nisti ory o ard Moo e Ba g. ern hoda ), C nean prisin	d His gent A ossess h stra c pro of firs & Bac dels ( ision yes n recog s - Pr classif is clus ng tw	tory o Agents sing. ttegies oblems t order ckwarc HMM) trees nodels gnitior incipa icatior stering			
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Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 2 Unit: 4 Unit: 5 Examination sessional examination	tents:	PO2 2 2 2 2 Introd Artific Struct Inform Adver Know logic, chaini Bayes Mach Statist Learn Patter syster Comp Techr algori uation	PO ₃ 2 1 - Re duction cial Intecture of I duction ned sea sarial Se ledge R Inferen ing, Pro ian Net ine Lea tical lea ing with rn Recon, Statist onent A hiques - thms. Pattern s/ quiz/	PO ₄ 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	PO ₅ le; 2 - S luction e, Appl: ent Agen orch: Se crategies cearch f ntation rst orde ic rease Search f ntation rst orde ic rease Super nodels, n data - n: Intro (PCA) a st Neig	PO ₆ Significations to Artificiations nts. Com earching s, Local for game & Reaso er logic, oning, U vised an learning EM algo oduction ecognitic and Line hbor (NP	PO7 mt; 3 – Str cial Intell of Artific puter visit for solution search all s, Alpha – ning: Prof Resolution tility theorem and unsurg g with con- porthm, Ref n, Design pon, Parama ar Discrific N) Rule, B al evaluat	PO ₈ ong igence, ial Inte on, Natu- cions, U gorithm Beta pr position n, Unific position n, Unific pory, Hide pervised mplete princip eter est ninant A ayes Cla ion (30 n	PO ₉ 1 Found lligence ural La niform s and uning. al logic cation, den M learn data - ment le les of imatio assifier marks)	ations e, Int nguag led se optim c, The Forw arkov ing, Naive earnin patte n met s (LDA c, K-m	s and ellig ge Po arch nisti ory o ard Moo e Ba g. ern hoda ), C nean prisin	d His gent A ossess h stra c pro of firs & Bac dels ( ision yes n recog s - Pr classif is clus ng tw	tory of Agents sing. ttegies oblems t orden ckwarc HMM) trees, nodels, gnition rincipal ication stering			

2	Rich E. and Knight K., "Artificial Intelligence", Tata McGraw Hill.
Refe	erence Books:
1	Patterson D. W., "Artificial Intelligence and Expert Systems", Prentice Hall of India.
2	Russell S. and Norvig P., "Artificial Intelligence – A Modern Approach", Pearson Education

MTCS315	Code									ture	nester:	
	Data MiningLDate of Approval: 16th BoS 17-11-20223								Т Р	P III		
Version: 1.2				of Appro	oval: 16	th BoS 17			3	1 0		111
	Scheme	1 1					Sc			nination	1	
	f Periods	: 60 Hrs. Maximum								:	100	
Period	s/Week	: 4								uation	:	30
	Credits	: 3								mester	:	70
Instructi			ecture					Ex	am Du	ıration	:	3 Hrs.
Prerequisite	<b>`</b>											
Course Obje												
<ol> <li>To acquir to Data v</li> <li>To demo</li> </ol>	varehouse	cept of e and da arious s	critical ata mini chema r	thinkin ng. nodel a	g, probl Ind the	em solvii Star Scho	ng and DE ema to de 1s.					n respect
Course Outc				i		0						
COs No.		/		S	tateme	nt						rogram s (POs)
CO ₁							o present				PO ₁ , F	. /
CO ₂							or managii ta mart ef				PO ₃ , F	20.
	adminis	ster the		esource			that it wi				PO3, F	04
CO ₃					w tech	nologies	to dete	rmine	their		PO4, F	20.
03	potenti	al impa		ur inf			ce for a la				r 04, r	U9
CO ₄					ion in D	ata minin	<i>~</i>			DC		DO
PO ₁ - Enginee								lonmont	t of a		$\mathbf{D}_3, \mathbf{PO}_4$	
O ₁₂ - Life-long Learning Mapping of course outcomes with program outcomes												
Course			Ĩ				Ī			20		
Course Outcomes	PO ₁	PO ₂	ping of PO₃	course PO ₄	outcon PO ₅	nes with PO ₆	program PO ₇	outcom PO ₈	PO ₉	PO ₁₀	PO ₁	1 <b>PO</b> 12
Outcomes CO ₁	<b>PO</b> ₁		PO ₃				Ī			PO ₁₀	PO ₁	1 <b>PO</b> 12
Outcomes		PO ₂	Ĩ	<b>PO</b> ₄			Ī			PO10	PO ₁	1 <b>PO</b> 12
Outcomes CO ₁ CO ₂ CO ₃		PO ₂	<b>PO</b> ₃	<b>PO</b> ₄			Ī		<b>PO</b> ₉	PO ₁₀	PO ₁	1 PO ₁₂
Outcomes CO ₁ CO ₂		PO ₂	<b>PO</b> ₃ 2 2 2	<b>PO</b> ₄	PO ₅	PO ₆	<b>PO</b> ₇	PO ₈	PO ₉	PO ₁₀	PO ₁	1 PO ₁₂
Outcomes           CO1           CO2           CO3           CO4	2	PO ₂	<b>PO</b> ₃ 2 2 2	<b>PO</b> ₄	PO ₅	PO ₆	Ī	PO ₈	<b>PO</b> ₉	PO ₁₀	PO ₁	1 PO ₁₂
Outcomes           CO1           CO2           CO3           CO4	2	<b>PO</b> ₂ 2	PO ₃ 2 2 1 - Re	PO ₄ 1 2 1 easonab	PO5	PO6	PO7 nt; 3 - Str	PO ₈	<b>РО</b> 9			
Outcomes CO ₁ CO ₂ CO ₃	2 itents:	PO2 2 Intro Techi Attrib and I Data	PO ₃ 2 2 1 – Re duction nologies oute typ Dissimila Integrat	PO₄ 1 2 1 easonab Used, used, es, Basi arity. D ion, Da	PO5 le; 2 – S amental Applic ic Statis ata Pre ta Redu	PO ₆ Significat s of Dat ations a stical des <b>process</b> action, Dat	PO7 mt; 3 – Str ta Mining nd Issues scriptions ing: Need ata Transf	PO ₈ ong , Kinds s in Da of Dat: d of Pre- formatic	PO ₉ 1 1 1 of Pa ata Mii a, Mea eproce	tterns o ning. <b>T</b> suring o ssing, I	can bo ypes data S Data (	e mined, of Data: imilarity Cleaning,
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cor	2 1	PO2 2 Intro Techi Attrib and I Data Ware	PO ₃ 2 2 1 - Ra duction nologies oute typ Dissimila (ntegrat Wareho house	PO ₄ 1 2 1 2 assonab cassonab cassonab Used, es, Basi arity. D ion, Da puse an Design	PO5 le; 2 - S amental Applic ic Statis ata Pre ta Redu d OLAI and	PO ₆ Significat s of Dat ations a stical des process action, Data V Usage,	PO ₇ nt; 3 – Str ta Mining nd Issues scriptions ing: Need	PO ₈ ong , Kinds s in Da of Data d of Pre formation e, Data Varehou	PO ₉ 1 1 1 of Pa ta Mita a, Mea eproce on. Warel	tterns o ning. <b>T</b> suring o essing, I house M	can bo ypes data S Data ( Modeli	e mined, of Data imilarity Cleaning ng, Data
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cor	2 1 1 2 1 2 1	PO2 2 Intro Techn Attrib and I Data Ware Gener Minin Analy Evalu	PO ₃ 2 2 1 - Re duction hologies bute typ Dissimila Integrat Wareho house ralizatio ng Freq sis, Ass ation m	PO₄ 1 2 1 2 1 2 2 3 2 3 2 3 2 2 3 3 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3	PO5 le; 2 – S amental Applic ic Statis bata Pre ta Redu d OLAI and tribute Pattern n rule n Constr	PO ₆ Significant s of Data ations a stical dest process action, Data P: Data V Usage, -oriented s, Assoon mining, I aint base	PO7 mt; 3 – Str ta Mining nd Issues scriptions ing: Neec ata Transf Warehous Data W	PO ₈ ong ong of Data of Data of Data d of Pro formatic e, Data Varehou on and Co Item se	PO ₉ 1 1 1 of Pa ata Mira a, Mea eproce on. Warel use Ir orrelat et min	tterns of ning. T suring of ssing, I house M nplemen ions: M ing met	can bo ypes data S Data ( Modelii ntatio Market thods,	e mined of Data imilarity Cleaning ng, Data n, Data t Basket Pattern
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cor Unit: Unit:	2 1 1 2 1 1 2 3	PO2 2 Intro Techi Attrib and I Data Ware Gene Minii Analy Evalu and M Class Induc by Ba	PO ₃ 2 2 1 - Re duction nologies oute typ Dissimila Integrat Wareho house ralization mg Free sis, Asse ation mo fultidim ification tion, Ba ck-prop	PO₄ 1 2 1 2 1 2 2 2 3 2 3 2 3 2 3 2 3 2 3 2 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3	PO5 le; 2 - S amental Applic ic Statis sata Pre ta Redu d OLAI and tribute Pattern n rule n Constr al patte ral appussificat h, Lazy	PO6 Significat Significat sof Data ations a stical dese process ction, Da P: Data V Usage, -oriented s, Assoc mining, I aint base rns. roach to ion meth Learners	PO7 nt; 3 – Str ta Mining nd Issues scriptions ing: Need ata Transf Warehous Data W d induction ciations Frequent	PO ₈ ong ong , Kinds s in Da of Data d of Pre- formatic e, Data Varehou n and Co Item se an patte	PO ₉ 1 1 of Pa ata Mia a, Mea eproce on. Warel use Ir orrelat et min rn min assifica lief Net	tterns of ning. T suring of sssing, I house M nplemen ions: M ing met ing, Min ation by	can bo ypes data S Data C Modeli ntatio Market thods, ning N Decis , Class	e mined, of Data imilarity Cleaning ng, Data n, Data t Basket Pattern fultilevel ion Tree

	<b>Data Mining Trends and Research Frontiers:</b> Mining Complex Data Types, Data Mining Applications, Data Mining Trends and usage of Data Mining Tools.
Exar	nination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	ional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semester examination.
Text	t Books:
1	Han J & Kamber M, "Data Mining: Concepts and Techniques", Harcourt India, Elsevier India, Second
	Edition.
2	Pang-Ning Tan. Michael Steinback, Vipin Kumar, "Introduction to Data Mining", Pearson Education,
	2008.
Refe	erence Books:
1	Margaret H Dunham,S.Sridhar, "Data mining: Introductory and Advanced Topics", Pearson
	Education, 2008
2	Humphires,hawkins,Dy, "Data Warehousing: Architecture and Implementation", Pearson Education,
	2009.

Course (					Course 7				Lec	ture	S	emester:	
MMCA31	6PET	8							T P				
Version: 1.2	~ 1			of Appr	oval: 16t	th BoS 17			3	1 0			
		of Instruction Scheme of Exa									10.0		
	f Periods	: 60 Hrs.			Maximum S Internal Evalua					:	100		
Period	s/Week	: 4									:	30	
Instructi	Credits	: 3	oturo							mester	:	70 2 Uma	
			cture					EX	am Du	iration	:	3 Hrs.	
Prerequisite Course Objee		requisi	te										
<ol> <li>To under</li> <li>To demo</li> <li>To analyz</li> </ol>	stand dig nstrate th ze the mai the tools	ital marketing, important conceptual insights and perspectives. e use of tools required for effective digital marketing. rket impact from digital marketing, of digital marketing to get best visibility in market.							es.				
COs No.					Statem	ent						Program nes (POs)	
CO ₁	an adde	ed tool a	as a pro	blem sc	olver and	d solutio	echnical n provide	r.		e		, <b>PO</b> ₂	
CO ₂	Tools					_	ization ke	eyword	planne			<b>PO</b> 3, <b>PO</b> 7	
<u>CO3</u>						e right d		1 ~	, .			$O_6, PO_9$	
CO ₄	Apply v Twitter			nedia pl	attorm	tor mark	eting suc	h as Fa	cebool	K, <b>P</b>	<b>∪</b> 3, P	O5, PO10	
Sustainability, PO ₁₂ - Life-long							program						
Course Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	<b>PO</b> ₇	PO ₈	PO ₉	<b>PO</b> ₁₀	PC	P11 PO ₁₂	
CO ₁	2	2											
CO ₂		2	2				2						
CO ₃				1		1			1				
CO ₄			2		2					2			
			1 – Re	easonab	le; 2 – S	ignificar	nt; 3 – Str	ong					
Detailed Con	tents:												
Unit:	Unit: 1 Introduction to Digital Marketing and its Significance Tradi Digital Marketing Digital Marketing Process. Website Plannin Types of websites Website Planning and Development, Unc and Webhosting Building Website/Blog using CMS Word Pres Plug-ins							ing and ndersta ess, Usi	Dev ndin ng W	elopment: g Domain ′ord Press			
Introduction to Search Engine Optimization Keyword Pl         Techniques-Indexing and Key Word Placement, On         Unit: 2       Content Optimization on Page SEO: Yoast, SEO P         Techniques, Email Marketing- Introduction and Signifi         marketing campaigns using Mail Chimp						On Pa ) Plug	ge SEO Techniques- g-in, Off –Page SEO						
Unit:	3	Buildi Email Pay Pe word,	ng E-m –Atomi er Click Types ning an	ail List ization. Advert of Biddi	and Sigi ising: In ng strat	nup Forn itroducti tegies	ns, Email on Pay Pe	Email Marketing Strategy and Monitoring Pay Per Click Advertising: Google Ad paigns, Designing and Monitoring Display					
Unit:	4	Design App C Googl Setup	ning an ampaig e Analy	gns /tics: In /standin	troduct g Goals	ion and s and Co	npaigns D Significat	nce Goo s. Moni	ogle Aı toring	nalytics Traffic	Inte Beh	rface and avior and	

	Unit: 5	Setting up Facebook Advertising Account, Understanding Facebook Audience and its Types Designing Facebook Advertising Campaigns. Working with Facebook Pixel, Twitter Marketing: Basics Designing, Twitter Advertising Campaigns. Introduction to LinkedIn Marketing Developing digital marketing strategy in Integration form
Exa	mination and Evalu	uation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	ional exams/ assig	nments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semester	examination.
Text	t Books:	
1		Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable
	Online Campaign	s by Ian Dodson, Wiley; 1st edition (2016)
2	Digital Marketing	For Dummies by Ryan Deiss and Russ Henneberry, For Dummies.
Refe	erence Books:	
1	Understanding D	igital Marketing: Marketing Strategies for Engaging the Digital Generation by
	Damian Ryan, Ko	gan Page Publisher
2	Digital Marketing	by Seema Gupta, McGraw Hill Education

Course Co									Lecture Semes			ester:	
MMCA317P	Internet of Things (IoT) Date of Approval: 16th BoS 17-							L 3	Т	P		II	
Version: 1.2				Appro	<b>val:</b> 16tł	n BoS 17	1 0						
									of Exan		-	100	<u> </u>
No. of F			Hrs.						laximum			100	
Periods/	Credits	: 4 : 3						Inte	rnal Eval				
Instruction			cture						End Sei Exam Di		_	2 1	Irs.
Prerequisite(s)				a Secu	rity Art	ificial Ir	ntelliger		Exam Du	iration		51	118.
Course Objecti		arc, ne	CWOIKIII	g, secu			neingei						
1. To underst		concen	t of IoT										
2. To learn the													
3. To demons					evices.								
4. To apply Io	T Archit	ecture	in differ	ent ap	plicatio	ns.							
Course Outcon													
COs No.				S	stateme	nt				Ma	ppe	d Pro	gram
												mes (	
CO ₁	Explain	and de	monstra	ate vari	ous con	nponent	ts of Int	ternet of	Things			PO ₁	
	(IoT)												
CO ₂	Investig	gate an	d propo	ose var	rious re	quireme	ents of	IoT for	[.] real		PC	D ₂ , PO	4
	world a												
	Describ	e and e	valuate	differe	nt appli	cations	of the I	oT.		Р	<b>O</b> 3,	<b>PO</b> 5, 1	PO ₉
CO ₄	Analyze	the rol	le and ir	nportai	nce of Io	oT in the	e mode	rn world	l;		PC	<b>D</b> ₂ , <b>PO</b>	6
PO ₁₂ - Life-long L	earning								Project n	nanager	nen	t and i	
PO ₁₂ - Life-long La	PO ₁							ion, <b>PO</b> 11- m outco <b>PO</b> 8	-	nanager PO10		PO ₁₁	
Course Outcomes	PO ₁	Мар	ping of	course	outcom	es with	progra	m outco	mes	-			PO ₁₂
Course Outcomes CO ₁		Map PO ₂	ping of	course PO ₄	outcom	es with	progra	m outco	mes	-			
Course Outcomes CO ₁ CO ₂	PO ₁	Мар	PO3	course	outcom PO₅	es with	progra	m outco	mes PO ₉	-			
Course Outcomes CO ₁ CO ₂ CO ₃	PO ₁	Map <b>PO</b> ₂ 2	ping of	course PO ₄	outcom	es with	progra	m outco	mes	-			
Course Outcomes CO ₁ CO ₂	PO ₁	Map PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	Progra PO7	m outco PO ₈	mes PO ₉	-			
$\begin{array}{c} Course \\ \hline Outcomes \\ \hline CO_1 \\ \hline CO_2 \\ \hline CO_3 \\ \hline CO_4 \end{array}$	<b>PO</b> ₁ 2	Map <b>PO</b> ₂ 2	PO ₃	PO ₄	outcom PO₅	PO ₆	Progra PO7	m outco PO ₈	mes PO ₉	-			
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte	<b>PO</b> ₁ 2	Map PO2 2 2	<b>PO</b> ₃ 2 1 - Re	PO4 1 asonabl	outcom PO5 2 Le; 2 – Si	PO ₆	progra PO ₇ nt; 3 – S	m outco PO ₈	mes PO ₉	PO ₁₀		PO ₁₁	PO
Course Outcomes CO ₁ CO ₂ CO ₃	<b>PO</b> ₁ 2	Map PO ₂ 2 2 Intro	PO ₃ PO ₃ 2 1 - Re duction	PO ₄ 1 asonabl	outcom PO5 2 Le; 2 – Si	PO ₆ 1 ignificat	PO7 PO7 nt; 3 - S	m outco PO ₈ Strong	mes PO ₉	PO ₁₀		PO ₁₁	PO
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1	<b>PO</b> ₁ 2	Map PO2 2 2 Introo Basic Comm	PO3 PO3 2 1 - Rea duction s of Net	PO4 PO4 1 asonabl to IoT, workin on	PO5 PO5 2 le; 2 – Si IOT Arc g Comn Protoco	PO6 1 ignification chitectuon nunication ls, S	progra PO7 nt; 3 - S nre, Sen ion Prot ensor	m outco PO ₈ Strong sing, Actor cocols. Netwo	mes PO ₉ 2 tuation,	PO ₁₀	of	PO ₁₁	PO
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte	<b>PO</b> ₁ 2	Map PO2 2 2 Intro Basic Comn Comn	Ping of PO ₃ 2 1 - Re duction s of Net nunication	PO4 PO4 1 asonabl to IoT, workin on 1 ons and	PO5 2 le; 2 – Si IOT Arc g Comm Protoco d Introd	PO6 1 ignification chitectumunication ls, Soluction	progra PO7 nt; 3 – S ure, Sen ton Prot ensor to SDN,	m outco PO ₈ Strong sing, Actocols. Netwo	mes PO ₉ 2 tuation, orks, r IoT.	PO ₁₀ Basics Machi	of 1	PO ₁₁	PO ₁₂
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2	<b>PO</b> ₁ 2	Map PO2 2 2 Intro Basic Comn Comn Interc	PING OF PO3 2 1 - Re duction s of Net nunicati nunicati pperabil	PO4 1 asonabl to IoT, workin on 1 ons and ity in Id	PO5 2 le; 2 – Si g Comn Protoco d Introd	PO6 PO6 1 ignification chitectur nunication ls, S luction	Progra PO7 nt; 3 – S Ire, Sen ion Prot ensor to SDN, n to Arc	m outco PO ₈ Strong sing, Act cocols. Netwo , SDN for duino Pr	mes PO ₉ 2 tuation, orks, r IoT. ogramm	PO ₁₀ Basics Machi	of 1	PO ₁₁	PO ₁
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1	<b>PO</b> ₁ 2	Map PO2 2 2 Intro Basic Comm Comm Interc tools/	PO ₃ PO ₃ 2 1 – Re duction s of Net nunicati pperabil /platfor	PO4 PO4 1 asonabl to IoT, workin on and ity in Ioms, Inte	outcom PO5 2 le; 2 – Si IOT Ard g Comn Protoco d Introd oT, Intro egration	es with PO ₆ 1 ignificati chitectu nunicati ls, S luction to oduction of Sens	progra PO7 nt; 3 – S ure, Sen to SDN, n to Arc sors and	m outco PO ₈ Strong Strong Strong Strong SDN for Juino Pr I Actuato	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with	PO ₁₀ Basics Machi	of 1	PO ₁₁	PO ₁
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2	<b>PO</b> ₁ 2	Map PO2 2 2 Intro Basic Comn Comn Interc tools/ to Ras	PO3 PO3 2 1 – Re duction s of Net nunicati pperabil /platfor spberry	PO4 PO4 1 asonabl to IoT, workin on and ity in Ioms, Into Pi, Imp	outcom       PO5       2       Le; 2 - Si       IOT Ard       g Comm       Protoco       d Introd       oT, Intro       egration       lementa	PO6 PO6 1 ignification chitectur nunication luction oduction of Sense ation of	PO7 PO7 nt; 3 – S Ire, Sen Ire, Sen Ire	m outco PO ₈ Strong sing, Act cocols. Netwo SDN for duino Pr d Actuato h Raspbo	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with erry Pi.	PO ₁₀ Basics Machi ing, Io Arduin	of 1 ne-	PO ₁₁ Netwo to-M levelo ntrod	PO ₁
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2	<b>PO</b> ₁ 2	Map PO2 2 2 Intro Basic Comm Comm Interc tools/ to Ras IOT b	Ping of PO ₃ 2 1 - Re duction s of Net nunicati nunicati perabil /platfor spberry pased C	PO4 PO4 1 asonabl to IoT, workin on 1 ons and ity in Io ms, Into Pi, Imp loud Co	PO5 PO5 2 le; 2 – Si IOT Ard g Comn Protoco d Introd oT, Intro egration lementa omputir	PO6 PO6 1 ignificat chitectu nunicati ls, S luction to oduction of Sense ation of ng, Sense	PO7 PO7 nt; 3 – S nt; 5 –	m outco PO ₈ Strong sing, Actor cocols. Netwo , SDN for duino Pr d Actuato h Raspbo ud, Fog	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with	PO ₁₀ Basics Machi ing, Io Arduin	of 1 ne-	PO ₁₁ Netwo to-M levelo ntrod	PO ₁
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2 Unit: 3	<b>PO</b> ₁ 2	Map PO2 2 2 Intro Basic Comm Comm Interc tools/ to Ras IOT to Smar	Ping of PO ₃ 2 1 - Re duction s of Net nunicati perabil /platfor spberry pased C t Homes	PO4 PO4 1 asonable to IoT, workin on and ity in Id ms, Inte Pi, Imp loud Co s, Data	PO5 PO5 2 le; 2 – Si IOT Arc g Comn Protoco d Introd oT, Intro egratior lementa omputir Handlin	es with PO6 1 ignificat chitectu nunicati ls, S luction to oduction n of Sens ation of ng, Sens ig and A	PO7 PO7 nt; 3 – S nt; 3 –	m outco PO ₈ Strong Strong sing, Act cocols. Netwo , SDN for duino Pr d Actuato h Raspbo ud, Fog s.	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with erry Pi. Comput	PO ₁₀ Basics Machi ing, Io Arduin	of 1 ne- T d o, I	PO ₁₁ Netwo to-M levelo ntrod	PO1 orking achin pmen uction es and
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2 Unit: 3 Unit: 4	<b>PO</b> ₁ 2	Map PO2 2 2 Introo Basic Comm Comm Interc tools/ to Ras IOT t Smar IOT F	Ping of PO ₃ 2 1 - Re duction s of Net nunicati perabil /platfor spberry pased C t Homes Based C	PO4 PO4 1 asonable to IoT, workin on 1 ons and ity in Io ms, Inte Pi, Imp loud Co s, Data onnect	outcom       PO5       2       le; 2 - Si       IOT Are       g Comn       Protoco       d Introd       oT, Intro       egration       lementa       omputin       Handlin       ed Vehi	es with PO6 1 ignification chitectur nunication ls, So luction of Sense ation of ng, Sense g and A cles, Sn	PO7 PO7 nt; 3 – S nt; 3 –	m outco PO ₈ Strong Strong sing, Actor cocols. Netwo , SDN for duino Pr d Actuato h Raspbo ud, Fog s. id, And 1	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with erry Pi. Comput	PO ₁₀ Basics Machi ing, Io Arduin ing, Sr al IoT.	of I ne- T d o, I mar	PO ₁₁ Netwo to-M levelo ntrod t Citio	PO1 orking achin pmen uction es and
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2 Unit: 3	<b>PO</b> ₁ 2	Map PO2 2 2 Intro Basic Comn Comn Interc tools/ to Ras IOT b Smar IOT F IOT F	Ping of PO ₃ 2 1 - Re duction s of Net nunication perabil /platfor spberry pased C t Homes Based C Case Stu	PO4 PO4 1 asonabl to IoT, workin on f ons and ity in Io ms, Into Pi, Imp loud Co s, Data onnect udy: Agn	outcom       PO5       2       le; 2 - Si       IOT Are       g Comn       Protoco       d Introd       oT, Intro       egration       lementa       omputin       Handlin       ed Vehi	es with PO6 1 ignification chitectur nunication ls, So luction of Sense ation of ng, Sense g and A cles, Sn	PO7 PO7 nt; 3 – S nt; 3 –	m outco PO ₈ Strong Strong sing, Actor cocols. Netwo , SDN for duino Pr d Actuato h Raspbo ud, Fog s. id, And 1	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with erry Pi. Comput	PO ₁₀ Basics Machi ing, Io Arduin ing, Sr al IoT.	of I ne- T d o, I mar	PO ₁₁ Netwo to-M levelo ntrod t Citio	PO1
Course Outcomes CO₁ CO₂ CO₃ CO₄ Detailed Conte Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5	PO1 2 nts:	Map PO2 2 2 Intro Basic Comn Comn Interc tools/ to Ras IOT b Smar IOT F IOT F IOT C	Ping of PO ₃ 2 1 – Re duction s of Net nunication perabil /platfor spberry pased C t Homes Based C Case Stu oncepts	PO4 PO4 1 asonable to IoT, workin on for ons and ity in Ion ms, Into Pi, Imp loud Co s, Data onnect udy: Agn	PO5 PO5 2 le; 2 – Si IOT Ard g Comm Protoco d Introd oT, Intro egratior lementa omputir Handlin ed Vehi riculture	PO6 PO6 1 ignification chitectur nunication ls, S luction to oduction of Sense ation of ng, Sense ug and A cles, Sm e, Healtl	Progra PO7 nt; 3 – S nt; 3	m outco PO ₈ Strong Strong Strong Strong SDN for duino Pr d Actuato h Raspbe ud, Fog s. id, And J Activity M	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with erry Pi. Comput	PO ₁₀ Basics Machi ing, Io Arduin ing, Sr al IoT. ng, Imp	of 1 ne- T d o, I mar	PO ₁₁ Netwo to-M levelo ntrod t Citio plicati nenta	PO1
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination ar	PO1 2 nts:	Map PO2 2 2 Intro Basic Comn Comn Interc tools/ to Ras IOT t Smar IOT F IOT, C IoT c	Ping of PO ₃ 2 1 – Re duction s of Net nunicati perabil /platfor spberry pased C t Homes Based C Case Stu oncepts Pattern:	PO4 1 asonabl to IoT, workin on 1 ons and ity in Io ms, Into Pi, Imp loud Co s, Data onnect idy: Agr It inclu	PO5 2 2 IOT Arc g Comm Protoco d Introd oT, Intro egratior lementa omputin Handlin ed Vehi riculture	PO6 PO6 1 ignification chitectur nunication ls, S luction to oduction of Sense ation of ng, Sense ag and A cles, Sn e, Healtl	Progra PO7 nt; 3 – S Irre, Sen ion Prot ensor to SDN, n to Arc sors and IoT wit sor-Cloin nalytics nart Gri hcare, A al evalu	m outco PO ₈ Strong Strong Strong Strong SDN for duino Pr d Actuato h Raspbo ud, Fog s. id, And I activity M ation (30	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with erry Pi. Comput Industria Aonitorin	PO ₁₀ Basics Machi ing, Io Arduin ing, Sr al IoT. ng, Imp comp	of 1 ne- T d o, I mar	PO ₁₁ Netwo to-M levelo ntrod t Citic plicati nenta ng two	PO1
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination an sessional exams	PO1 2 nts: nts:	Map PO2 2 2 Introd Basice Comn Comn Intero tools/ to Ras IOT to Smar IOT to Smar IOT to Smar	ping of PO ₃ 2 1 - Re duction s of Net nunicati perabil /platfor spberry pased C t Homes Based C Case Stu oncepts Pattern: / quiz/	PO4 1 asonabl to IoT, workin on 1 ons and ity in Io ms, Into Pi, Imp loud Co s, Data onnect idy: Agr It inclu	PO5 2 2 IOT Arc g Comm Protoco d Introd oT, Intro egratior lementa omputin Handlin ed Vehi riculture	PO6 PO6 1 ignification chitectur nunication ls, S luction to oduction of Sense ation of ng, Sense ag and A cles, Sn e, Healtl	Progra PO7 nt; 3 – S Irre, Sen ion Prot ensor to SDN, n to Arc sors and IoT wit sor-Cloin nalytics nart Gri hcare, A al evalu	m outco PO ₈ Strong Strong Strong Strong SDN for duino Pr d Actuato h Raspbo ud, Fog s. id, And I activity M ation (30	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with erry Pi. Comput Industria Aonitorin	PO ₁₀ Basics Machi ing, Io Arduin ing, Sr al IoT. ng, Imp comp	of 1 ne- T d o, I mar	PO ₁₁ Netwo to-M levelo ntrod t Citic plicati nenta ng two	PO1 orking achin pmen uction es and ions o tion o o class
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination an sessional exams is mainly end se	PO1 2 nts: nts:	Map PO2 2 2 Introd Basice Comn Comn Intero tools/ to Ras IOT to Smar IOT to Smar IOT to Smar	ping of PO ₃ 2 1 - Re duction s of Net nunicati perabil /platfor spberry pased C t Homes Based C Case Stu oncepts Pattern: / quiz/	PO4 1 asonabl to IoT, workin on 1 ons and ity in Io ms, Into Pi, Imp loud Co s, Data onnect idy: Agr It inclu	PO5 2 2 IOT Arc g Comm Protoco d Introd oT, Intro egratior lementa omputin Handlin ed Vehi riculture	PO6 PO6 1 ignification chitectur nunication ls, S luction to oduction of Sense ation of ng, Sense ag and A cles, Sn e, Healtl	Progra PO7 nt; 3 – S Irre, Sen ion Prot ensor to SDN, n to Arc sors and IoT wit sor-Cloin nalytics nart Gri hcare, A al evalu	m outco PO ₈ Strong Strong Strong Strong SDN for duino Pr d Actuato h Raspbo ud, Fog s. id, And I activity M ation (30	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with erry Pi. Comput Industria Aonitorin	PO ₁₀ Basics Machi ing, Io Arduin ing, Sr al IoT. ng, Imp comp	of 1 ne- T d o, I mar	PO ₁₁ Netwo to-M levelo ntrod t Citic plicati nenta ng two	PO1 orking achin pmen uction es and ions o tion o o class
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2 Unit: 3 Unit: 4	PO1 2 nts:	Map PO2 2 2 Introo Basic Comn Comn Interc tools/ to Ras IOT t Smar IOT F IOT F IOT C Smar	ping of PO ₃ 2 1 - Re duction s of Net nunicati perabil /platfor spberry based C t Homes Based C Case Stu oncepts Pattern: / quiz/ nation.	PO4 PO4 1 asonable to IoT, workin on 1 ons and ity in Io ms, Inte Pi, Imp loud Co s, Data onnect udy: Agr It inclu semina	outcom       PO5       2       le; 2 - Si       IOT Are       g Comn       Protoco       d Introd       oT, Intro       egration       lementa       omputin       Handlin       ed Vehi       riculture       ide both       ar prese	es with PO6 1 ignificat chitectu nunicati ls, S luction to oduction of Sens ation of ng, Sens ag and A cles, Sn e, Healtl n interna ntation	PO7 PO7 nt; 3 – S rre, Sen on Prot ensor to SDN, n to Arc sors and IoT wit sor-Clo nalytics nart Gri hcare, A al evalu etc. and	m outco PO ₈ Strong Strong sing, Actor cocols. Netwo , SDN for duino Pr d Actuato h Raspbo ud, Fog s. id, And I activity M ation (30 d extern	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with a erry Pi. Comput Industria Aonitorin D marks) al evalua	PO ₁₀ Basics Machi ing, Io Arduin ing, Sr al IoT. ng, Imp comp tion (7	of 1 ne- T d o, I mar risin 0 m	PO ₁₁ Netwo to-M levelo ntrod t Citio plicati nenta ng two narks)	PO1 orking achine pmen uction es and tion o o clas which
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination at sessional exams is mainly end se Text Books: 1 Internet o Press).	PO1 2 nts:	Map PO2 2 2 Introo Basic Comn Comn Interc tools/ to Ras IOT t Smar IOT F IOT F IOT F IOT C IoT cc IoT ccc IoT cc IoT ccc IoT ccc	ping of PO ₃ 2 1 - Read duction s of Net nunication perabil /platfor spberry based C t Home Based C Case Stu oncepts Pattern: / quiz/ nation.	PO4 PO4 1 asonabl to IoT, workin on 1 ons and ity in Io ms, Into Pi, Imp loud Co s, Data onnect udy: Agn It inclu semina	outcom PO5 2 2 Ie; 2 – Si IOT Are g Comn Protoco d Introd oT, Intro egration lementa omputir Handlin ed Vehi riculture ide both ar prese	es with PO ₆ 1 ignificat chitectu nunicati ls, S luction to oduction of Sense ation of ng, Sense g and A cles, Sn e, Healtl n interna ntation y Arshd	PO7 PO7 nt; 3 – S nt; 4 –	m outco PO ₈ Strong ssing, Actor cocols. Netwo SDN for duino Pr d Actuato h Raspbo ud, Fog s. id, And D activity M ation (30 d extern hga and	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with a erry Pi. Comput Industria Aonitorin D marks) al evalua	PO ₁₀ Basics Machi ing, Io Arduin ing, Sr al IoT. ng, Imp comp tion (7	of 1 ne- T d o, I mar risin 0 m	PO ₁₁ Netwo to-M levelo ntrod t Citio plicati nenta ng two narks) Unive	POn prking achine pmen uction es and ions o tion o o clas which ersitie
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3 Unit: 3 Unit: 4 Unit: 5 Examination ar sessional exams is mainly end se Text Books: 1 Internet of	PO1 2 nts: nts: nd Evalue s/ assign emester of Thing net of	Map PO2 2 2 Introo Basic Comn Comn Interc tools/ to Ras IOT b Smar IOT F IOT F IOT C IOT C IOT C Smar IOT F IOT C Smar IOT F IOT C Smar IOT F IOT C Smar IOT F IOT C Smar IOT F IOT C IoT C Smar IOT F IOT C IoT C	ping of PO ₃ 2 1 - Re duction s of Net nunication perabil /platfor spberry based C Case Stu oncepts Pattern: / quiz/ nation. ands-or	PO4 PO4 1 asonabl to IoT, workin on 1 ons and ity in Io ms, Into Pi, Imp loud Co s, Data onnect udy: Agr It inclu semina	outcom PO5 2 2 Ie; 2 – Si IOT Are g Comn Protoco d Introd oT, Intro egration lementa omputir Handlin ed Vehi riculture ide both ar prese	es with PO ₆ 1 ignificat chitectu nunicati ls, S luction to oduction of Sense ation of ng, Sense g and A cles, Sn e, Healtl n interna ntation y Arshd	PO7 PO7 nt; 3 – S nt; 4 –	m outco PO ₈ Strong ssing, Actor cocols. Netwo SDN for duino Pr d Actuato h Raspbo ud, Fog s. id, And D activity M ation (30 d extern hga and	mes PO ₉ 2 tuation, orks, r IoT. ogramm ors with a erry Pi. Comput Industria Aonitorin D marks) al evalua	PO ₁₀ Basics Machi ing, Io Arduin ing, Sr al IoT. ng, Imp comp tion (7	of 1 ne- T d o, I mar risin 0 m	PO ₁₁ Netwo to-M levelo ntrod t Citio plicati nenta ng two narks) Unive	POn prking achine pmen uction es and ions o tion o o clas which ersitie

Refe	erence Books:
1	Buyya, R., & Dastjerdi, A. V. (Eds.). (2016). Internet of Things: Principles and paradigms. Elsevier.
2	Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting everything", 1st Edition, Apress Publications, 2013.

Course Co	Course Title Lectu							ture		Se	mester: III		
MMCA318P	ET			Cor	npiler I	Design			L	Т	Р		
Version: 1.2		<b>Date of Approval:</b> 16th BoS 17-11-2022 3						1	0				
S	cheme o	of Instr	uction				:	Scheme o	of Exan	ninat	ion		
No. of F	Periods	: 60 Hrs. Maximum						Scor	re	:	100		
Periods/		: 4						Interr	nal Eval	luatic	n	:	30
	Credits	: 3 End Sem								:	70		
Instruction			eture					E	xam Dı	iratic	n	:	3 Hrs.
Prerequisite(s)		ing Sys	tem										
Course Objecti			phagag	in the	docion	af a com	nilon						
<ol> <li>To understand</li> <li>To demonstant</li> </ol>													
3. To analyze						tom up	parsers	•					
4. To develop						get mac	chine.						
Course Outcon	0		,			0							
COs No.				1	Statem	ent				N	Лар	ped	Progran
											Out	com	es (POs)
					esignin	g, devel	oping, <mark>a</mark>	nd imple	mentin	g		PO1,	PO2
	a compi												
	Demonst				1		,	1				PC	
								order to				PO3	, PO4
	the period							time con	ipiexit	y.	DO	12 14	04, PO5
PO ₁ - Engineerin									t of so	Jutio			
investigations of													
sustainability, PO	8- Ethics,												
PO12- Life-long Le	earning												
		Марј	oing of	course	outcom	es with	program	n outcon	nes	1			-
Course	PO ₁	Марј <b>РО</b> 2	oing of ∙ <b>PO</b> ₃	course <b>PO</b> ₄	outcom	es with	progran <b>PO</b> 7	n outcom	nes PO ₉	РО	10	PO	11 <b>PO</b> 12
Outcomes		PO ₂					• • •			РО	010	PO	11 <b>PO</b> 1
Outcomes CO ₁	<b>PO</b> ₁ 2		PO ₃				• • •			PO	010	PO	11 PO1
Outcomes           CO1           CO2		PO ₂	<b>PO</b> ₃	PO ₄			• • •			PO	910	PO	II PO1
Outcomes           CO1           CO2           CO3		PO ₂	PO ₃				• • •			PO	10	PO	PO1
Outcomes           CO1           CO2		PO ₂	<b>PO</b> ₃ 2 2 2	<b>PO</b> ₄	<b>PO</b> ₅	PO ₆	<b>PO</b> ₇	PO ₈		PO	910	PO	PO1
Outcomes           CO1           CO2           CO3	2	PO ₂	<b>PO</b> ₃ 2 2 2	<b>PO</b> ₄	<b>PO</b> ₅	PO ₆	• • •	PO ₈		PO	10	PO	
Outcomes           CO1           CO2           CO3           CO4	2	<b>PO</b> ₂ 2	<b>PO</b> ₃ 2 2 2 <b>1 - Re</b>	PO ₄ 1 1 asonabl	PO₅ 1 e; 2 − S	PO ₆	PO ₇	PO ₈	PO ₉				
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte	2	PO ₂ 2 Introd	PO ₃ 2 2 1 - Re	PO4 1 asonabl	PO5 1 e; 2 - S?	PO ₆	<b>PO</b> ₇ <b>nt; 3 – S</b> ure of a	PO ₈	PO ₉	ical A	anal	ysis	- Role c
Outcomes           CO1           CO2           CO3           CO4	2	PO ₂ 2 Introd Lexica Token	PO ₃ 2 2 2 1 - Real	<b>PO</b> ₄ 1 1 asonable to con	PO5 1 e; 2 - St npilers: nput B	PO ₆ ignificat Structu uffering	PO7 nt; 3 – S ure of a g –Speci	PO ₈	PO ₉	ical A ens	nal	ysis	– Role c
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte	2	PO ₂ 2 Introd Lexica Token DFA.	PO ₃ 2 2 2 1 - Re luction al Analy s - Lex	PO ₄ 1 1 asonabl to con 'zer - 1 - Finite	PO5 1 e; 2 – S npilers: nput B e Auton	PO ₆ ignificat Structu uffering nata – R	PO7 nt; 3 – S ure of a g –Speci egular E	PO ₈ trong compiler fication xpression	PO ₉	ical A ens -	anal – R	ysis ecog – Mi	– Role c nition c
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte	2	PO2 2 Introd Lexica Token DFA. Synta	PO ₃ 2 2 2 1 - Re luction al Analy is - Lex x Analy	PO ₄ 1 asonabl to com vzer - 1 - Finito vsis: Ro	PO ₅ 1 e; 2 - S npilers: nput B e Auton le of Pa	PO ₆ ignificat Structu uffering nata – R arser –	PO7 mt; 3 – S ure of a g –Speci egular E Gramm	PO ₈ trong compiler fication xpression ars – Err	PO ₉	ical A ens - utom	nnal - R ata	ysis ecog – Mi Con	– Role c nition c inimizin text-fre
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1	2	PO2 2 Introd Lexica Token DFA. Synta gram	PO ₃ 2 2 2 1 - Re luction al Analy is - Lex x Analy nars -	PO ₄ 1 asonabl to con vzer - 1 - Finite vsis: Ro Writin	PO ₅ 1 e; 2 – S npilers: nput B e Autom le of Pa g a gr	PO ₆ ignificat Structu uffering nata – Ro arser – cammar	PO7 mt; 3 – S ure of a g –Speci egular E Gramm –Top-I	PO ₈ trong compiler fication xpression ars – Err Down Pa	PO ₉ - Lexi of Tok ns to A ror Har rsing	ical A ens - utom	nnal - R aata g -	ysis ecog – Mi Con ral S	– Role c nition c inimizin text-fre trategie
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte	2	PO ₂ 2 Introd Lexica Token DFA. Synta gramr Recur	PO ₃ 2 2 2 1 - Re luction al Analy as - Lex x Analy nars - sive Des	PO ₄ 1 1 asonabl to con vzer - 1 - Finito vsis: Ro Writin scent P	PO ₅ 1 e; 2 – S ppilers: nput B e Auton le of Pa g a gr arser Pn	PO ₆ ignificat Structu uffering hata – Re arser – ammar redictive	PO7 PO7 mt; 3 – S ure of a g –Speci egular E Gramm –Top-I e Parser	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa	PO ₉ - Lexi of Tok ns to Ar ror Har rsing rser-S	ical A ens - utom ndling – Ge	g – Rener	ysis ecog – Mi Con ral S uce P	– Role c nition c inimizin text-fre trategie arser-L
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1	2	PO2 2 Introo Lexica Token DFA. Synta gram Recur Parsen	PO ₃ 2 2 2 1 - Re luction al Analy as - Lex x Analy nars - sive Dec c-LR (0)	PO ₄ 1 1 asonable to com /zer - 1 - Finite /sis: Ro Writin scent P ) Item	PO ₅ 1 e; 2 - Se npilers: nput B e Auton le of Pa g a gr arser Pi Constru	PO ₆ ignificat Structu uffering nata – Re arser – rammar redictive uction of	PO7 PO7 mt; 3 – S ure of a g –Speci egular E Gramm –Top-I e Parser of SLR I	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa Parsing T	PO ₉ - Lexi of Tok ns to A ror Har rsing - Sable - Sable -	ical A ens - utom ndling – Ge	g – Rener	ysis ecog – Mi Con ral S uce P	– Role c nition c inimizin text-fre trategie arser-L
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1	2	PO2 2 Introo Lexica Token DFA. Synta gram Recur Parsen Parsen	PO ₃ 2 2 1 - Re luction al Analy as - Lex x Analy nars - sive De sive De c-LR (0) c - Erro	PO ₄ 1 asonable to com zer - 1 - Finite vsis: Ro Writin scent P ) Item r Hand	PO ₅ 1 e; 2 - St npilers: nput B e Auton le of Pa g a gr arser Pr Constru ing and	PO ₆ ignificat Structu uffering nata – Ro arser – redictive action of Recover	PO7 PO7 mt; 3 – S ure of a g –Speci egular E Gramm –Top-I e Parser of SLR I ery in Sy	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa Parsing T ntax Ana	PO ₉ – Lexi of Tok ns to Ai rsing rsing Sable – lyzer	ical A ens - utom dliną – Ge hift R	anal – R aata g – ener edu duc	ysis ecog – Mi ral S ral S rat S rat S	- Role of nition of inimizin text-fre trategie arser-L to LAL
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2	2	PO2 2 Introd Lexica Token DFA. Synta gram Recur Parsen Parsen Intern	PO ₃ 2 2 1 - Re luction al Analy as - Lex x Analy nars - sive Dec c-LR (0) c - Erro nediate	PO4 1 asonable to com /zer - 1 - Finite visis: Ro Writin scent P ) Item r Handle COde (	PO ₅ 1 e; 2 - St nput B e Auton le of Pa g a gr arser Pr Constru ling and Genera	PO ₆ ignificat Structu uffering nata – Re arser – ammar redictive uction c l Recove tion: Sy	PO7 PO7 mt; 3 – S are of a g –Speci egular E Gramm –Top-I e Parser of SLR F ery in Sy mtax Dir	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa Parsing T ntax Ana rected Do	PO ₉ - Lexi of Tok ns to A rrsing - rrsing - lyzer efinitio	ical A ens - utom ndliną - Ge hift R Intro	g – Rener Redu duc	ysis ecog – Mi Con ral S uce P etion	- Role of nition of inimizin text-free trategies arser-L to LAL n Order
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Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2	2	PO2 2 Introd Lexica Token DFA. Synta gramm Recur Parsen Parsen Intern for Sy Addre Check	PO ₃ 2 2 1 - Re luction al Analy as - Lex x Analy nars - sive Dec r-LR (0 r - Erro nediate rhax D ss Coo ing.	PO ₄ 1 asonabl to com vzer - 1 - Finite vsis: Ro Writin scent P ) Item r Handl c Code birected le, Typ	PO ₅ 1 e; 2 - Si ppilers: input B e Auton le of Pa g a gr arser Pr Constru ing and Genera Defini ies and	PO ₆ ignificat Structu uffering hata – Re arser – cammar redictive laction of l Recove tion: Sy tions, In l Decla	PO7 PO7 mt; 3 – S ure of a g –Speci egular E Gramm –Top-I e Parser of SLR I ery in Sy mtax Din ntermed rations,	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa Parsing T ntax Ana rected Do liate Lan Transla	PO ₉ - Lexi of Tok ns to A ror Har rsing urser-Sl able - lyzer efinitio guages tion o	acal A ens - utom hift R Intro ns, E : Syr f Ex	anal – R aata g – Redu duc duc valu	ysis ecog – Mi Con ral S uce P tion uatio : Tre ssior	- Role c nition c inimizin text-fre trategie arser-L to LAL n Order e, Thre ns, Typ
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3	2	PO2 2 Introd Lexica Token DFA. Synta gram Recur Parsei Parsei Parsei Intern for Sy Addre Check <b>Run-</b>	PO ₃ 2 2 1 - Re luction al Analy as - Lex x Analy nars - sive Des r-LR (0) r - Erro nediate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate rotate	PO ₄ 1 asonable to com vzer - 1 - Finite vsis: Ro Writin scent P ) Item r Handle Code birected le, Typ nvironi	PO ₅ 1 e; 2 - S pilers: input B e Auton le of Pa g a gr arser Pr Constru ling and Genera Defini bes and	PO ₆ ignificat Structu uffering nata – Re arser – armar redictive action of Recove tion: Sy tions, In 1 Decla nd Cod	PO7 PO7 mt; 3 – S ire of a g –Speci egular E Gramm –Top-I e Parser of SLR H ery in Sy mtax Din ntermed irations, e Gene	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa Parsing T ntax Ana crected Da liate Lan Transla ration: S	PO ₉ - Lexi of Tok ns to A ror Har rsing - urser-Sl able -] lyzer efinitio guages tion o Storage	acal A ens - utom ndliną - Ge hift R Intro ns, E : Syr f Ex - Org	g - Rata g - Rata duc duc valu ntax pre	ysis ecog – Mi Con ral S ice P etion iatio : Tre sssion zatio	- Role c nition c inimizin text-fre trategie arser-L to LAL n Order e, Thre ns, Typ
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2	2	PO2 2 Introd Lexica Token DFA. Synta gram Recur Parsei Parsei Parsei Intern for Sy Addre Check <b>Run-</b> Alloca	PO ₃ 2 2 1 - Re luction al Analy as - Lex x Analy nars - sive Dea c-LR (0) c - Erro nediate matax D ss Cod ting. Cime E tion S	PO ₄ 1 asonabl to con zer - 1 - Finite vsis: Ro Writin scent P ) Item r Handl code of birected de, Typ nvironi Space,	PO ₅ 1 e; 2 - S npilers: nput B e Autom le of Pa g a gr arser Pr Constru- ling and Genera Defini- bes and nent a Access	PO ₆ ignificat Structu uffering nata – Re arser – ammar redictive uction c l Recove tions, In l Decla nd Cod s to	PO7 PO7 mt; 3 – S ire of a g –Speci egular E Gramm –Top-I e Parser of SLR F ery in Sy ntax Din ntermed irations, e Gene Non-loo	PO ₈ trong compiler fication xpression ars – Err Down Pa –LL (1) Pa Parsing T ntax Ana rected De liate Lan Transla <b>ration</b> : S cal Dat	PO ₉ - Lexi of Tok ns to A ror Har rsing urser-Si able] lyzer efinitio guages tion o Storage a on	ical A ens - utom ndliną - Ge hift R Intro ns, E : Syr f Ex : Syr f Ex	g - Raata g - Raata duc valu tax pre	ysis ecog – Mi Con ral S ice P ttion iatio : Tre sssion zatic Stack	- Role c nition c inimizin text-fre trategie arser-L to LAL n Order e, Thre ns, Typ on, Stac c, Hea
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3	2	PO2 2 2 Introd Lexica Token DFA. Synta gram Recur Parsen Parsen Parsen Intern for Sy Addre Check <b>Run-T</b> Alloca Manag	PO ₃ 2 2 1 - Re luction al Analy as - Lex x Analy nars - sive Des sive Des c-LR (0) c - Erro nediate mata D ss Coc ing. Fime Endiate	PO ₄ 1 asonable to com zer – J - Finita vsis: Ro Writin scent P ) Item r Handle Code of birected le, Typ nvironn Space, - Issue	PO ₅ 1 e; 2 - Si npilers: nput B e Auton le of Pa g a gr arser Pr Constru- ling and Genera Defini- ves and ment a Access s in Con	PO ₆ ignificat Structu uffering nata – Re arser – ammar redictive uction c l Recove tion: Sy tions, In d Decla nd Cod s to de Gene	PO7 PO7 mt; 3 – S ure of a g –Speci egular E Gramm –Top-I e Parser of SLR H ery in Sy ntax Din ntermed intermed intermed rations, e Gene	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa Parsing T ntax Ana rected Do liate Lan Transla ration: S cal Dat	PO ₉ - Lexi of Tok ns to Ai ror Har rsing - lyzer efinitio guages tion o Storage a on of a sim	ical A ens - utom ndliną - Ge hift R Intro ns, E : Syr f Ex the pple C	anal – Rener Redu duce valu ntax g – S cod	ysis ecog – Mi Con ral S ice P ttion iatio : Tre sssion zatic Stacl e Ge	- Role of nition of inimizin text-fre trategie arser-L to LAL n Order e, Thre ns, Typ on, Stac c, Hea nerator.
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3 Unit: 4	2	PO2 2 2 Introd Lexica Token DFA. Synta gramm Recur Parsen Parsen Parsen Intern for Sy Addre Check <b>Run-7</b> Alloca Manag Code	PO ₃ 2 2 2 1 - Re duction al Analy as - Lex x Analy nars - sive Des c-LR (0) c - Erro nediate value of the second rotax D ss Coc ing. Fime Est tion S gement Optimis	PO ₄ 1 asonable to com zer – 1 - Finite vsis: Ro Writin scent P ) Item r Handle Code birected le, Typ nvironn Space, - Issue zation:	PO ₅ 1 e; 2 - S: pilers: nput B e Auton le of Pa g a gr arser Pr Constru- ling and Genera Defini- bes and Ment a Access s in Coo Princip	PO ₆ ignificat Structu uffering nata – Re arser – ammar redictive uction c l Recove tion: Sy tions, In l Decla nd Cod s to de Gene oal Source	PO7 PO7 mt; 3 – S are of a g –Speci egular E Gramm –Top–I e Parser of SLR F ery in Sy mtax Din ntermed arations, e Gene Non–loo eration – ces of O	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa Parsing T ntax Ana rected Da liate Lan Transla ration: S cal Dat Design o ptimizati	PO ₉ - Lexi of Tok ns to Ar or Har rsing - rser-Si able lyzer efinitio guages tion o Storage a on of a sim on - Pe	ical A ens - utom ndliną - Ge hift R Intro ns, E : Syr f Ex the pple C eep-h	anal - R aata g - R ener Redu duc valu ntax pre gani 2 Cod nole	ysis ecog – Mi Con ral S ice P etion iatio statio stack e Ge e opti	- Role of nition of inimizin text-fre trategie arser-L to LAL n Order e, Thre ns, Typ on, Stac c, Hea <u>nerator</u> .
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3	2	PO2 2 Introd Lexica Token DFA. Synta gramm Recur Parsen Parsen Parsen Intern for Sy Addre Check <b>Run-T</b> Alloca Manag Code – DAC	PO ₃ 2 2 2 1 - Re duction al Analy s - Lex x Analy nars - sive Dec r-LR (0) r - Erro nediate value of the second r - LR (0) r - Erro nediate r - LR (0) r - Erro nediate r - Erro o fine Est G - Optimiz G - Optimiz	PO₄ 1 asonabl to com //zer – 1 - Finita //sis: Ro Writin scent P ) Item r Handl c Code birected le, Typ nvironn Space, - Issue zation: mizatio	PO ₅ 1 e; 2 - S: pilers: nput B e Auton le of Pa g a gr arser Pr Constru- ling and Genera Defini- bes and Ment a Access s in Coo Princip	PO ₆ ignificat Structu uffering nata – Re arser – ammar redictive uction c l Recove tion: Sy tions, In l Decla nd Cod s to de Gene oal Source	PO7 PO7 mt; 3 – S are of a g –Speci egular E Gramm –Top–I e Parser of SLR F ery in Sy mtax Din ntermed arations, e Gene Non–loo eration – ces of O	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa Parsing T ntax Ana rected Do liate Lan Transla ration: S cal Dat	PO ₉ - Lexi of Tok ns to Ar or Har rsing - rser-Si able lyzer efinitio guages tion o Storage a on of a sim on - Pe	ical A ens - utom ndliną - Ge hift R Intro ns, E : Syr f Ex the pple C eep-h	anal - R aata g - R ener Redu duc valu ntax pre gani 2 Cod nole	ysis ecog – Mi Con ral S ice P etion iatio statio stack e Ge e opti	- Role of nition of inimizin text-free trategie arser-L to LAL n Order e, Three ns, Typ on, Stac c, Hea nerator imizatio
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5	2 nts:	PO2 2 2 Introd Lexica Token DFA. Synta gramr Recur Parsee Parsee Interr for Sy Addre Check Run-T Alloca Manag Code – DAC Flow A	PO ₃ 2 2 2 1 - Re luction al Analy s - Lex x Analy nars - sive Des c - LR (0) c - Erro nediate main A D ss Coc ing. Fime E tion S gement Optimis G - Optin Mgorith	PO₄ 1 asonabl to com //zer – 1 - Finita //sis: Ro Writin scent P ) Item r Handl c Code //irected le, Typ nvironi Space, - Issue zation: mizatio m.	PO ₅ 1 e; 2 - S pilers: input B e Auton le of Pa g a gr arser Pr Constru- ling and Genera Defini- bes and Access s in Coo Princip n of Ba	PO ₆ ignificat Structu uffering hata – R arser – ammar redictive uction of Recove tion: Sy tions, In d Decla nd Cod s to de Gene sic Bloc	PO7 PO7 mt; 3 – S mt; 3 – S m	PO ₈ trong compiler fication xpression ars – Err Down Pa -LL (1) Pa Parsing T ntax Ana rected Do liate Lan Transla ration: S cal Dat Design o ptimizati l Data Fl	PO ₉ - Lexi of Tok ns to Ai ror Har rsing - rser-Sl vable - lyzer efinitio guages tion o Storage a on of a sim on – Pe ow Ana	ccal A ens - utom ndliną - Ge hift R Intro ns, E : Syr f Ex the pple C eep-H alysis	anal - R aata g - R aata duc duc valu ntax pre gani e S Cod nole s - S	ysis ecog – Mi Con ral S ice P etion iatio c Tre ession zatic Stack e Ge e opti Effici	- Role of nition of inimizin text-free trategie arser-L to LAL n Order e, Thre ns, Typ on, Stac c, Hea nerator imizatio ient Dat
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Text	t Books:
1	Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi
	Sethi, Jeffry D. Ullman, Pearson.
2	Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.
Refe	erence Books:
1	Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University
	Press.
2	The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH

Course Co	ode	Course Title     Lect       Pattern Recognition     L							ture			ester:	
MMCA3191	PET			Patte	ern Reco	gnition			L	Т	Р		
Version: 1.2			Date o	f Appro	oval: 16t	h BoS 17-	-11-2022	2	3	1	0		
	Scheme	of Instr	uction				S	Scheme o	of Exan	ninat	ion		
No. of	Periods	: 60	Hrs.					Ма	ximum	Scor	re	:	100
Periods	/ Week	: 4						Internal Evaluation					30
	Credits	: 3 End Se								mester : 70			
Instructio			cture					Ez	xam Dı	iratio	n	:	3 Hrs.
Prerequisite(s	,	matics a	and Mae	chine Le	earning								
Course Object													
1. To underst													
2. To equip w													
3. To acquire								s for rea	l world	prob	oler	ns.	
4. To apply p		<u> </u>	on tech	niques	in pract	ical prot	olems.						
Course Outcon	nes (CO	):								1			
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						on and	machin	e intellig	gence				
60		nms and					- 4 4	·					<u> </u>
$CO_2$						feature					1	PO ₂ , PO	<b>)</b> 4
		ion, ana	iyze and	arelate	researc	h in the	pattern	recognii	.1011				
CO ₃	area.	oth cur	orvisod	and ur	auporu	ised clas	cificatio	n moth	de to			3, PO5,	DO.
$CO_3$		-			-		Sincatio	mineuid	Jus to		FU	3, <b>FU</b> 5,	FO9
,	uevelo							1 . 1 1					DO
CO.	develop PR system in real-world data.CO4Develop pattern recognition techniques to real-world problem						hlome	<b>PO</b> ₃ , <b>PO</b> ₄ , <b>PO</b> ₅					
CO ₄											PO	3, <b>PO</b> 4,	PO5
CO ₄	such as	object	detecti	on and	recogni	tion and	to imp	lement s	imple		рО	3, <b>PO</b> 4,	PO5
CO ₄	such as patterr	s object 1 classif	detecti	on and	recogni		to imp	lement s	imple		РО	3, PO4,	PO ₅
<b>PO</b> 1- Engineerin	such as patterr recogn	s object 1 classif izers. 1edge, <b>1</b>	detection iers, cla <b>PO</b> 2- Pro	on and ssifier	recogni combina nalysis,	tion and ations, a	to imp nd stru sign/de	lement s ctural pa	imple attern t of so	olutio	ns,	PO ₄ - 0	Conduct
<b>PO</b> 1- Engineerin investigations of	such as patterr recogn ng Know complex	s object 1 classif izers. 1edge, <b>F</b> 2 problem	detection iers, cla PO2- Pro- ns, PO5-	on and ssifier oblem a Modern	recogni combina nalysis, tool usa	tion and ations, a $\mathbf{PO}_3$ - De age, $\mathbf{PO}_6$ -	to imp nd stru sign/de The eng	lement s ctural pa velopmen ineer and	imple attern t of so society	plution 7, <b>PO</b> 7	ns, - Er	PO ₄ - 0	Conduc ient and
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<b>PO</b> 1- Engineerin investigations of	such as patterr recogn ng Know complex D8- Ethics	s object a classifi izers. ledge, <b>F</b> s problen s, <b>PO</b> 9- In	detection iers, cla P <b>O</b> 2- Pro ns, <b>PO</b> 5- dividual	on and ssifier oblem a Modern or team	recogni combina nalysis, tool usa work, <b>PC</b>	tion and ations, a PO ₃ - De ge, PO ₆ - D ₁₀ - Comn	to imp nd stru sign/de The eng nunicatio	lement s ctural pa velopmen ineer and on, <b>PO</b> 11- P	imple attern t of so society Project n	plution 7, <b>PO</b> 7	ns, - Er	PO ₄ - 0	Conduct ient and
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sess	<b>mination and Evaluation Pattern:</b> It include both internal evaluation (30 marks) comprising two class sional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which ainly end semester examination.
	t Books:
1	Duda, Hart and Stork, Pattern Classification, Second Edition, Wiley, 2001.

Pattern Recognition principles: Julus T. Tou and Rafel C. Gonzalez, Addision –Wesley

**Reference Books:** 

1 S. Theodoridis, K. Koutroumbas, Pattern Recognition, Academic Press, 1999

2 Pattern recognition and machine learning, Christopher M. Bishop, Springer 2006

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		Databases and JSP. Representing Web Data: XML-Documents and
		Vocabularies-Versions and Declaration-Namespaces- DOM based XML
		processing Event-oriented Parsing: SAX-Transforming XML Documents-
		Selecting XML Data: XPATH-Template based Transformations: XSLT-Displaying
		XML Documents in Browsers.
		AJAX (Asynchronous Java And XML): Ajax Client Server Architecture-XML Http
		Request Object-Call Back Methods. Web Services: JAX-RPC-Concepts-Writing
	Unit: 5	a Java Web Service-Writing a Java Web Service Client-Describing Web Services:
		WSDL- Representing Data Types: XML Schema-Communicating Object Data:
		SOAP Related Technologies-Software Installation-Storing Java Objects as Files.
Exa	nination and Evalu	ation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	ional exams/ assig	nments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semester	examination.
Text	: Books:	
1	Jeffrey C. Jackson	, "Web TechnologiesA Computer Science Perspective", PearsonEducation, 2006.
2	Ari Lerner, "ng-Bo	ooks the Complete Books on AngularJS", Fullstack.io, 2013.
Refe	erence Books:	
1	Robert W. Sebesta	a, "Programming with World Wide Web", Addison Wesley, 7th edition, 2013
2	Deitel, Deitel, Go	ldberg, "Internet & World Wide Web How To Program", ThirdEdition, Pearson
	Education, 2006.	

	de		Course Title Artificial Neural Network						Lec	ture	Sen	nester:			
MTCS322P	СТ			Artificia	l Neura	l Netwo	rk		L	Т	Р	111			
Version: 1.2	-					h BoS 17		2	3	1	0				
S	Scheme of InstructionScheme of Examplef Periods:60 Hrs.Maximum								f Exan	ninati	n				
No. of I									ximum	Score	:	100			
Periods	/ Week	: 4								uatior	:	30			
	Credits	: 3						E	and Ser	nestei	• :	70			
Instruction		: Lecture Exam Du									uration : 3 Hrs.				
Prerequisite(s)		al Intelli	gence												
Course Objecti															
1. To underst					, , , , , , , , , , , , , , , , , , ,		, ,								
2. To acquire							gnitive	modelin	g.						
<ol> <li>To impleme</li> <li>To analyze</li> </ol>							noural r	otwork							
4. To analyze Course Outcon	1		and dy	namica	isysten	is using	neurai	letworks	•						
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COS NO.				3	latemen	11					tcomes				
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CO ₃		ent the	neura	l netwo	ork algo	orithms	and sol	ve real-	world		PO ₃ , PO	<b>)</b> 5			
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CO ₄	Perform	n evalua	tion of	neural	networl	k algoritl	nms.				PO ₄ , PO	)9			
PO1- Engineerin															
investigations of															
sustainability, PC		PO ₉ - Inc	lividual	or team	work, <b>PC</b>	10- Comn	nunicatio	n, <b>PO</b> 11- P	roject n	nanage	ment and	l finance,			
PO12- Life-long L	earning														
		Mapp	oing of o	course	outcom	es with J	orogram	outcom	es			- 1			
Course	PO ₁	PO ₂	PO ₃	PO₄	PO ₅	PO ₆	<b>PO</b> ₇	PO ₈	PO ₉	<b>PO</b> 10	PO ₁₁	<b>PO</b> ₁₂			
Outcomes															
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CO3 CO4 Detailed Conte Unit: 1 Unit: 2		Netwo Chara neural Struc Netw Archit Piecew Unsup Know	2 al char orks, No cteristi <u>netwo</u> cture of cork ectures vise l pervised ledge	acterist acterist erve str cs of No rks. a neura s, Artif inear 1 learnii Represe	2 e; 2 – Si cics of t cucture eural Ne al net (to function ng, Re-e entation	he huma and syn etworks, opology) euron, <i>A</i> on, Sig enforcen n, Artifi	an brair apse, B Termin , Directe Activatic moidal <u>nent Lea</u> cial In	a, Introd asic con ologies, . ed graph ed graph functic runctic rrning.	uction cepts Applica s, Mode cions, n, Su e, lea	of Net ations els of M Thres upervi	Jural Net of the ar Jeuron, nold fu sed le rules,	works, rtificial Neural nction, arning, Error			
CO ₃ CO ₄ Detailed Conte Unit: 1		Netwo Chara neural Struc Netw Archit Piecev Unsup Knowl correc learnin	2 al char orks, No cteristi l netwo cture of cork ectures vise l pervised ectures vise l pervised ectures ng, Bolt	acterist erve str cs of Ne rks. a neura s, Artifi inear l learnin Represe arning, tzmann	2 e; 2 – Si cics of t ructure eural Ne al net (to function ng, Re-e entation Memo learnir	he huma and syn etworks, ppology) euron, A enforcen n, Artifi ry baseo ag, singlo	an brair apse, B Termin Directe Activatio moidal ment Lea cial In 1 learni e layer	a, Introd asic con ologies, ed graph on functio functio telligenc ng, Heb perceptr	uction cepts Applica s, Mode ions, n, Su e, lea bian le on, Mu	of Net ations els of M Thres upervi urning earning	Iral Net of the ar Neuron, nold fu sed le rules, g, Comp	works, rtificial Neural nction, arning, Error petitive			
CO3 CO4 Detailed Conte Unit: 1 Unit: 2		Netwo Chara neural Struc Netw Archit Piecew Unsup Knowl correc learnin Back p	2 al char orks, No cteristi l netwo cture of vork ectures vise l pervised ledge etion le ng, Boli oropaga	acterist erve str cs of No rks. a neura s, Artifi inear l learnin Represe arning, tzmann tion, Re	2 e; 2 – Si cics of t cucture eural Ne al net (to function ng, Re-e entation Memo learnir ecurren	he huma and syn etworks, ppology) euron, <i>A</i> on, Sign enforcen h, Artifi ry based ag, single t networ	an brair apse, B Termin Directe Activatic moidal <u>nent Lea</u> cial In d learni e layer	a, Introd asic con ologies, ed graph on functic functic irning. telligenc ng, Heb perceptr work pru	uction cepts Applica s, Mode cions, n, Su e, lea bian le con, Mu ning.	of Net ations els of M Thres upervi urning earning ultilay	aral Net of the as Neuron, nold fu sed le rules, g, Comp er perce	works, rtificial Neural nction, arning, Error petitive eptron,			
CO3 CO4 Detailed Conte Unit: 1 Unit: 2		Netwo Chara neural Struc Netw Archit Piecev Unsup Knowl correc learnin Back p Adapt	2 al char orks, No cteristi netwo cture of cork ecture of vork ectures vise l pervisec ledge etion le ng, Bolt oropaga ive net	acterist erve str cs of No rks. a neura s, Artifi inear l learnin Repress arning, tzmann tion, Re works,	2 e; 2 – Si cics of t cucture eural Ne al net (to function ng, Re-e entation Memo learnir ecurren Superv	he huma and syn etworks, ppology) euron, A on, Sign enforcen n, Artifi ry based ig, single t networ vised Le	an brair apse, B Termin Directe Activatio moidal <u>nent Lea</u> cial In d learni e layer <u>ks, Net</u>	a, Introd asic con ologies, ed graph on functic functic rning. telligenc ng, Heb perceptr work pru Neural	uction cepts Applica s, Mode cions, n, Su e, lea bian le on, Mu ning. Netwo	of Net ations els of M Thres upervi urning earning ultilay rks, I	Iral Net of the a Neuron, nold fu sed le rules, g, Comp er perce	works, rtificial Neural nction, arning, Error petitive eptron, -based			
CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3		Netwo Chara neural Struc Netw Archit Piecev Unsup Knowl correc learnin Back <u>p</u> Adapt neural	2 al char orks, No cteristi netwo cture of ork ecture of vork ectures vise l pervisec edge ction le ng, Bolto oropaga ive net l netwo	acterist acterist erve str cs of No rks. a neura s, Artif inear l learnin Repress arning, tzmann tion, Re works, Hi	2 e; 2 - Si cics of t cucture eural Ne al net (to function ng, Re-e entation Memo learnir ecurren Superv erarchi	he huma and syn etworks, opology) euron, A on, Sign enforcen n, Artifi ry based ng, single t networ vised Le cal neur	an brair apse, B Termin , Directe Activatic moidal <u>nent Lea</u> cial In d learni e layer ks, Netw arning al netw	n, Introd asic con ologies, . ed graph on functic runing. telligence ng, Heb perceptr work pru Neural orks, Pr	uction cepts Applica s, Mode cions, n, Su e, lea bian le on, Mu ning. Netwo obabili	of Neu ations els of M Thres upervi rrning arning ultilay rks, I stic n	Iral Net of the at Neuron, hold fu sed le rules, g, Comp er perce Decision eural ne	works, rtificial Neural nction, arning, Error betitive eptron, -based etwork,			
CO3 CO4 Detailed Conte Unit: 1 Unit: 2		Netwo Chara neural Struc Netw Archit Piecev Unsup Knowl correc learnin Back p Adapt neural Radial	2 al char orks, No cteristic netwo cture of cork ectures vise 1 pervised edge ction le ng, Bolt propaga ive net netwo basis f	acterist acterist erve str cs of No rks. a neura s, Artif inear l learnin Repress arning, tzmann tion, Re works, Hi	2 e; 2 - Si cics of t cucture eural Ne al net (to function ng, Re-e entation Memo learnir ecurren Superv erarchi	he huma and syn etworks, opology) euron, A on, Sign enforcen n, Artifi ry based ng, single t networ vised Le cal neur	an brair apse, B Termin , Directe Activatic moidal <u>nent Lea</u> cial In d learni e layer ks, Netw arning al netw	a, Introd asic con ologies, ed graph on functic functic rning. telligenc ng, Heb perceptr work pru Neural	uction cepts Applica s, Mode cions, n, Su e, lea bian le on, Mu ning. Netwo obabili	of Neu ations els of M Thres upervi rrning arning ultilay rks, I stic n	Iral Net of the at Neuron, hold fu sed le rules, g, Comp er perce Decision eural ne	works, rtificial Neural nction, arning, Error betitive eptron, -based etwork,			
CO3 CO4 Detailed Conte Unit: 1 Unit: 2 Unit: 3		Netwo Chara neural Struc Netw Archit Piecev Unsup Knowl correc learnin Back p Adapt neural Radial percej	2 al char orks, No cteristic netwo cture of cork ectures vise 1 pervised edge ction le ng, Bolt propaga vive net netwo basis fo poron.	acterist acterist erve str cs of Ne rks. a neura s, Artif inear l learnin Represe arning, tzmann tion, Re works, Hi function	2 e; 2 – Si cics of t cucture eural Ne al net (to icial Ne function ng, Re-e entation Memo learnir ecurren Superv erarchin n netwo	he huma and syn etworks, opology) euron, A on, Sign enforcem n, Artifi ry based ag, single t networ vised Le cal neur orks, Cor	an brair lapse, B Termin , Directe Activatio moidal <u>hent Lea</u> cial In d learni e layer ks, Net arning al netw nparisio	a, Introd asic con ologies, . ed graph functic functic rning. telligenc ng, Heb perceptr work pru Neural orks, Pr on of RB	uction cepts Applica s, Mode cions, n, Su e, lea bian le on, Mu ning. Netwo obabili F Netw	of Net ations els of M Thres apervi arning arning ultilay rks, I stic nev vorks	Iral Net of the at Neuron, hold fu sed le rules, g, Comp er perce Decision eural ne and mu	works, rtificial Neural nction, arning, Error betitive eptron, -based etwork, ltilayer			
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Exa	mination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class
sess	sional exams/assignments/quiz/seminar presentation etc. and external evaluation (70 marks) which
is m	ainly end semester examination.
Text	t Books:
1	S. Haykin, "Neural Networks a comprehensive Foundation" second edition, Prentice-Hall India.
2	Laurene Fausett, "Fundamentals of Neural Networks, Architecture, Algorithms, and Applications",
	Prentice Hall, 1993
Refe	erence Books:
1	Jacek M. Zurada, Introduction to artificial neural systems, Jaico Publ. House, 1994.
2	Anderson, —An introduction to Artificial Neural NetworksI, Prentice Hall.

202.00 000	Course Code Course Title								Lec	ture			ester:	
MMCA323P	ET			Se	mantic	Web			L	Т	P			
Version: 1.2			Date o	f Appro	val: 16t	h BoS 17-	-11-2022		3	1	0			
S	cheme o	of Instr	uction				S	cheme o	f Exan	ninat	ion			
No. of P									Scor	e	:	100		
Periods/									al Eval	uatio	n	:	30	
(	ction Mode : Lecture Exam							E	nd Ser	emester : 70				
								am Du	Duration : 3 Hrs					
Prerequisite(s):		al Intelli	gence											
Course Objectiv		<b>-</b>												
<ol> <li>To learn abo</li> <li>To understa</li> </ol>					A.7T									
<ol> <li>To understa</li> <li>To create ar</li> </ol>					/v L.									
4. To form ont					from do	cument	to Data	Web						
Course Outcom	0,		g and n			cument	to Data	WCD.						
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					0	various	applicat	ions su	ch as		р	O2, PC	),	
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Course	PO ₁	мар <u>і</u> РО2	<b>PO</b> 3	PO ₄	PO ₅	es with p PO6	PO7	PO ₈	PO ₉	PO	10	<b>PO</b> ₁₁	PO ₁₂	
Outcomes			103	104	105	100	10/	108	109	10	U	101	1012	
	2	2												
<u>CO2</u>		2												
00			0					2						
<u>CO</u> 3									1					
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CO ₄	nts.	2	2	ısonablı	e; 2 – Si	gnifican	t; 3 – St	rong	1					
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CO ₄	nts:	Found	2 <b>1 – Ree</b> lation o ntic We	of Sema b, Sem	antic W nantic V	/eb Tecł	nologie	es: Intr es, A lay	oducti ered aj	pproa	ach	Desci	riptive	
CO ₄ Detailed Conter	nts:	Found Seman Logic, Langu	2 <b>1 – Red</b> lation o ntic We Introd	of Sema b, Sem uction, cension	antic W nantic V Definit s	Veb Tech Veb Tech tion of th	nnologie hnologie ne basic	es: Intr es, A lay formali	oducti ered a sm, Re	pproa eason	ach ing	Desci algor	riptive ithms,	
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CO4 Detailed Conter Unit: 1 Unit: 2	nts:	Found Seman Logic, Langu Struct Name Descri Syntas RDF an Web	2 <b>1 – Rea</b> lation on thic We Introd age ext spaces, bing W spaces, bing W spaces, bing W spaces, bing W spaces, on RDF spaces	of Sema b, Sem uction, censions Web I Addres eb Reso serializa Schema gy Lang	antic W Dantic V Definit s Docume sing and purces: I tion, Ri in RDF guage: 0	Veb Tech Veb Tech ion of th ents in d queryin RDF, Intro DF Scher Schema OWL Int	nnologie hnologi ne basic XML: og XML oductior na: Basic	es: Intr es, A lay formali Introdu <u>documer</u> n RDF: Ba e Ideas, on, OV	oducti ered aj sm, Re action, nt Proc asic Ide RDF Sc WL and	pproa eason XM eessin eas, F hema d RD	ach ing IL RDF a: TI	Descr algor Struct : XML he Lan	riptive ithms, turing, -Based guage, Three	
CO4 Detailed Conter Unit: 1 Unit: 2 Unit: 3	nts:	Found Seman Logic, Langu Struct Name Descri Syntay RDF at Web Sublar	2 <b>1 – Rea</b> lation of introd age ext ured spaces, bing W c, RDF and RDF Ontolog nguages	of Sema b, Sem uction, ension Web I Addres eb Reso serializa Schema gy Lang of OW	antic W Dantic V Definit s Docume sing and purces: I tion, Ri in RDF guage: 0	Veb Tech Veb Tech ion of th ents in d queryir RDF, Intro DF Scher Schema	nnologie hnologi ne basic XML: og XML oductior na: Basic	es: Intr es, A lay formali Introdu <u>documer</u> n RDF: Ba e Ideas, on, OV	oducti ered aj sm, Re action, nt Proc asic Ide RDF Sc WL and	pproa eason XM eessin eas, F hema d RD	ach ing IL RDF a: TI	Descr algor Struct : XML he Lan	riptive ithms, turing, -Based guage, Three	
CO4 Detailed Conter Unit: 1 Unit: 2 Unit: 3 Unit: 4	nts:	Found Seman Logic, Langu Struct Name Descri Syntax RDF an Web Sublan Examp	2 <b>1 - Rea</b> lation of introd lage ext spaces, bing W s, RDF s and RDF Ontolog nguages oles of C	of Sema b, Sen uction, <u>ension</u> Web I Addres eb Reso serializa Schema gy Lang of OW DWL	antic W hantic V Definit s Docume sing and urces: I tion, R tion, R un RDF guage: 0 VL, Des	Veb Tech Veb Tech ion of th ents in d queryin RDF, Intro DF Scher Schema OWL Int	Anologie Anologi ne basic XML: ag XML oduction na: Basic croducti of the	es: Intr es, A lay formali Introdu documen RDF: Ba c Ideas, on, OV OWL La	oductivered aj sm, Re action, nt Proc asic Ide RDF Sc VL and inguag	pproa ason XM eessin eas, F hema d RD e, La	ach ing IL g RDF a: T PF/I yer	Descr algor Struct XML he Lan RDFS, ing of	riptive ithms, turing, -Based guage, Three OWL,	
CO4 Detailed Conter Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5		Found Seman Logic, Langu Struct Name Descri Syntax RDF an Web Sublan Examp SPARC Patter	2 <b>1 - Rea</b> lation of introd age ext spaces, bing W c, RDF s ad RDF s ontolog nguages oles of C QL, SPA ns, Que	of Sema b, Sen uction, ension Web I Addres eb Reso serializa Schema Schema Schema gy Lang of OW WL IRQL s ries wit	antic W Dantic V Definit s Docume sing and urces: H tion, R in RDF guage: ( VL, Des imple ( h Data V	Veb Tech Veb Tech ion of th ents in d queryir RDF, Intro DF Scherna OWL Intro Cription Graph P Values, Fi	Annologie hnologie xML: ag XML oduction na: Basie croducti of the atterns, lters OV	es: Intr es, A lay formali Introdu documen n RDF: Ba to Ideas, on, OV OWL La Comple VL Forma	oducti ered a sm, Re action, at Proc asic Ide RDF Sc WL and unguage ex Gra al Sema	pproa ason XM essin eas, F hema d RD e, Lay ph F antics	ach ing IL g RDF a: T vF/1 yer	Descr algor Struct : XML he Lan RDFS, ing of erns,	riptive ithms, turing, -Based guage, Three OWL, Group	
CO4 Detailed Conter Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination an	d Evalu	Found Seman Logic, Langu Struct Name Descri Syntax RDF an Web Sublar Exam SPARC Patter <b>ation P</b>	2 <b>1 - Rea</b> lation of introd age ext spaces, bing W c, RDF s ad RDF s ontolog nguages bles of C QL, SPA ns, Que <b>attern:</b>	of Sema b, Sem uction, censions Web I Addres eb Reso serializa ceb Reso serializa Schema Schema gy Lang of OW WL aRQL s ries wit It inclu	antic W nantic V Definit s Docume sing and purces: H tion, R in RDF guage: 0 VL, Des imple 0 h Data V de both	Veb Tech Veb Tech Lion of the ents in d queryin RDF, Intro DF Scherna OWL Intro Cription Graph P Values, Fin interna	Annologie hnologi ne basic XML: ag XML oduction na: Basic croducti of the atterns, lters OV l evaluat	es: Intr es, A lay formali Introdu documen n RDF: Ba c Ideas, on, OV OWL La Comple VL Forma- cion (30	oductivered approximate of the second	A pproa ason XM essin eas, H hema d RD e, La ph F antics com	ach ing L g RDF a: T PF/I Patt s pris	Descr algor Struct : XML he Lan RDFS, ing of erns,	riptive ithms, turing, -Based guage, Three OWL, Group 70 class	
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	Knowledge Management", John Wiley and Sons, 2003.
Ref	erence Books:
1	Foundation of Semantic Web Technologies, Pascal Hitzler, Markus and Sebastian
2	Michael C. Daconta, Leo J. Obrst, and Kevin T. Smith, "The Semantic Web: A Guide to the Future of XML,
	Web Services, and Knowledge Management", Fourth Edition, Wiley Publishing, 2003.

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PO ₁₂ - Life-long 1 Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cont	Pe- Ethics, Learning PO1 2 ents:	PO ₉ - Inc Mapp PO ₂ 2 2 2 4 4 4 7 4 7 7 7 7 7 7 8 7 7 9 7 7 9 7 7 9 7 7 7 7	ividual o ping of o PO ₃ 2 2 2 1 – Rea 2 2 1 – Rea 1 2 1 – Rea 1 2 1 – Rea 1 1 1 1 1 1 1 1 1 1 1 1 1	asonable syntax ntroduc ctions, to PHI cifiers, ctures, rating S	vork, PO putcom PO5 2 2 2 e; 2 – Si dTML, es, imag and st ction to conditi P, Lang Variable Arrays, ystem.	es with p es with p PO ₆ gnifican formatti ges, form ructure, o JavaScr ons, loop uage Fea es, Cons Strings a	The engination program PO7 <b>t; 3 – St</b> ng and us. Style using C ript: Cli ps and re atures, stants, and Reg	neer and n, PO ₁₁ - P outcom PO ₈ fonts, sheets: SS, back ent-side epetition PHP Bas Expressi ular Exp	society, roject ma es PO ₉ 1 1 1 1 comme Need for scriptin scriptin , Pop up ics, PHI ions, St ressions	PO7- Env nagemer PO10 nting c r CSS, ir images, ng with b boxes. P's Supp ring In s, Worki	PO ₁₁ PO ₁₁ ode, controduo , colors JavaSo ported terpola ng with	PO 2 2 color, ction s and cript, Data ation, h the		
PO12- Life-long 1 Course Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2	Po-Ethics, Learning PO1 2 2 ents:	PO ₉ - Inc Mapp PO ₂ 2 2 2 4 4 4 7 4 7 7 9 7 9 7 9 7 9 7 9 7 9 7 9	ividual o ping of o PO ₃ 2 2 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 2 1 – Rea 2 1 – Rea 1 1 – Rea 1 1 – Rea 1 1 – Rea 1 1 1 1 1 1 1 1 1 1 1 1 1	PO4 PO4 asonable cs of H ts, table syntax ntroduc ctions, to PHI cifiers, ctures, rating S nl Form	vork, PO putcom PO5 2 2 2 e; 2 – Si HTML, es, imag and st ction to conditi P, Lang Variable Arrays, ystem. With F	PIO- Commession es with p PO6 gnifican formatti ges, form ructure, JavaScr ons, loop uage Fea es, Cons Strings a	The engination program PO7 PO7 t; 3 – St ng and using C ript: Cli ps and real stants, and Reg turing F	neer and n, PO ₁₁ - P outcom PO ₈ rong fonts, sheets: SS, back ent-side epetition PHP Bas Expressi ular Exp	society, roject ma es PO ₉ 1 1 1 1 comme Need for ground scriptin t, Pop up ics, PHI ions, St ressions a, Dealin	PO7- Env nagemer PO10 nting c r CSS, in images, ng with b boxes. P's Supp ring In s, Worki	PO ₁₁ PO ₁₁ ode, controdue , colors JavaSe ported terpola ng with	PO1 2 2 color, ction s and cript, Data ation, h the value		
PO ₁₂ - Life-long 1 Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cont	Po-Ethics, Learning PO1 2 2 ents:	PO ₉ - Inc Mapp PO ₂ 2 2 2 4 4 4 7 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9	ividual o ping of o PO ₃ 2 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 2 1 – Rea 2 1 – Rea 2 1 – Rea 2 1 – Rea 1 – Rea	PO4 PO4 asonable es of H ts, table e syntax ntroduc ections, to PHI cifiers, ctures, - rating S nl Form nerating	work, PO outcom PO5 2 2 2 2 2 2 2 2 2 2 2 2 2	PIO- Commes with p PO6 PO6 gnifican formatti ges, form ructure, JavaScroons, loop uage Fea es, Cons Strings a PHP: Cap ploaded	The engination program PO7 PO7 t; 3 – St ng and is. Style using C ript: Cli os and re atures, stants, and Reg turing F form, R	neer and n, PO ₁₁ - P outcom PO ₈ fonts, sheets: SS, back ent-side epetition PHP Bas Expressi ular Exp	society, roject ma es PO ₉ 1 1 1 1 comme Need for ground scriptin a, Pop up ics, PHI ions, St ressions a, Dealin ng a for	PO7- Env nagemen PO10 PO10 nting c r CSS, ir images, ng with boxes. P's Supp ring In- s, Worki ng with n after s	PO ₁₁ PO ₁₁ ode, colors JavaSe ported terpola ng with Multi	PO1 2 2 color, ction s and cript, Data ation, h the value ssion.		
PO ₁₂ - Life-long 1 Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cont Unit: 1 Unit: 2	Po-Ethics, Learning PO1 2 2 ents:	PO ₉ - Inc Mapp PO ₂ 2 2 2 4 4 4 7 7 7 7 7 7 7 7 8 7 7 7 9 7 8 7 7 9 7 7 7 7	ividual d ping of o PO ₃ 2 2 2 2 1 – Rea 2 2 1 – Rea 3 2 1 – Rea 3 2 1 – Rea 3 2 1 – Rea 3 2 1 – Rea 3 2 1 – Rea 3 3 3 1 – Rea 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	asonable es of H ts, table syntax ntroduc etions, to PHI ifiers, ctures, cating S nl Form nerating hat is	work, PO outcom PO5 2 2 2 e; 2 – Si HTML, es, imag and st ction to conditi P, Lang Variable Arrays, ystem. With F g File u	Pio- Comm es with p PO ₆ gnifican formatti ges, form ructure, JavaScroons, loop uage Fea es, Com Strings a PHP: Cap ploaded ion, Defi	The engination program PO7 PO7 t; 3 – St ng and is. Style using C ript: Cli os and re atures, stants, and Reg turing F form, R	neer and n, PO ₁₁ - P outcom PO ₈ rong fonts, sheets: SS, back ent-side epetition PHP Bas Expressi ular Exp form Dat	society, roject ma es PO ₉ 1 1 1 1 comme Need for ground scriptin a, Pop up ics, PHI ions, St ressions a, Dealin ng a for	PO7- Env nagemen PO10 PO10 nting c r CSS, ir images, ng with boxes. P's Supp ring In- s, Worki ng with n after s	PO ₁₁ PO ₁₁ ode, colors JavaSe ported terpola ng with Multi	PO: 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		
PO ₁₂ - Life-long 1 Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cont Unit: 1 Unit: 2	Po-Ethics, Learning PO1 2 2 ents:	PO ₉ - Inc Mapp PO ₂ 2 2 2 4 4 4 7 4 7 7 7 7 7 7 7 7 7 7 7 7	ividual d ping of of PO ₃ 2 2 2 1 – Ree 2 2 1 – Ree 2 2 1 – Ree 2 2 1 – Ree 2 1 – Ree 1 1 1 1 1 1 1 1 1 1 1 1 1	asonable es of H ts, table syntax ntroduc ctions, to PHI differs, ctures, rating S nl Form nerating hat is cursive	work, PO outcom PO5 2 2 2 e; 2 – Si HTML, es, imag and st conditi 2, Lang Variable Arrays, ystem. With F g File u a function function	Pio- Comm es with p PO ₆ gnifican formatti ges, form ructure, JavaScr ons, loop uage Fea es, Cons Strings a PHP: Cap ploaded ion, Defi on.	The engination program PO7 <b>t; 3 – St</b> ng and as. Style using C ript: Cli ps and re atures, stants, and Reg turing F form, R ine a fu	neer and n, PO ₁₁ - P outcom PO ₈ rong fonts, sheets: SS, back ent-side epetition PHP Bas Expressi ular Exp form Dat	society, roject ma es PO ₉ 1 1 1 comme Need for ground scriptin , Pop up ics, PHI ons, St ressions a, Dealin ng a forr Call by	PO ₇ - Envinagement PO ₁₀ PO ₁₀ nting c r CSS, in images, ng with boxes. P's Suppring In s, Worki ng with n after s value a	PO ₁₁ PO ₁₁ ode, C ntrodue, colors JavaSo ported terpola ng with Multi submis and Ca	PO ₁ 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		
PO ₁₂ - Life-long 1 Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cont Unit: 1 Unit: 2	Po-Ethics, Learning PO1 2 2 ents:	PO ₉ - Inc Mapp PO ₂ 2 2 2 4 4 4 7 4 7 4 7 7 7 7 7 7 7 7 7 7	dividual d ping of of PO ₃ 2 2 2 2 1 – Rea 2 2 2 1 – Rea 2 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 1 1 1 1 1 1 1 1 1 1 1 1 1	PO4 PO4 asonable asonable cs of F ts, table esyntax ntroduc actions, to PHI iffiers, ctures, cating S nl Form nerating hat is a cursive nanager cookies	work, PO outcom PO5 2 2 2 2 e; 2 - Si HTML, es, imag and st ction to conditi. P, Lang Variable Arrays, ystem. With F g File u a function nent: U s, Using	Pho- Commes with pro- es with pro- pro- gnifican formattinges, form ructure, o JavaScro ons, loop uage Fea es, Com- strings a PHP: Cap ploaded ion, Defion. Jsing qui sessio	The enginumication program PO7 <b>t; 3 – St</b> ng and us. Style using C ript: Cli ps and re atures, stants, and Reg turing F form, R ine a fu ery strin. PHF	neer and n, PO ₁₁ - P outcom PO ₈ fonts, sheets: SS, back ent-side epetition PHP Bas Expressi ular Exp orm Dat edirectir inction, o	society, roject ma es PO ₉ 1 1 1 1 comme Need foi scriptin , Pop up ics, PHI ions, St ressions a, Dealin ng a forr Call by rewrit match	PO7- Env nagemen PO10 nting c r CSS, in images, ng with b boxes. P's Supp ring In s, Worki n after s value a ing), Us ing wi	PO ₁₁ PO ₁₁ ode, controduce , colors JavaSo ported terpola ng with Multi submiss and Ca	PO1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		
PO12- Life-long 1 Course Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2	Pe-Ethics, Learning PO1 2 ents:	PO ₉ - Inc Mapp PO ₂ 2 2 2 4 4 4 7 4 7 4 7 7 7 7 7 7 8 7 7 7 7 8 7 7 7 7	ividual of ping of of PO ₃ 2 2 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 1 2 1 – Rea 1 2 1 – Rea 1 2 1 – Rea 1 1 1 1 1 1 1 1 1 1 1 1 1	PO4 PO4 asonable asonable asonable cs of H ts, table syntax ntroduc ctions, to PHI differs, ctures, rating S nl Form nerating hat is ccursive anager cookies What is	vork, PO putcom PO5 2 2 2 2 2 2 2 7 7 7 7 7 7 7 8 7 8 7 8 7	Pro- Commes with pro- es with pro- Pro- gnifican formattinges, form ructure, ons, loop uage Fea es, Com- Strings a PHP: Cap ploaded ion, Defi- on. Using qui sessio ar expres	The enginumication program PO7 PO7 t; 3 – St ng and s. Style using C ript: Cli ps and re atures, stants, and Reg turing F form, R ine a fu ery strif n. PHF ssion, Pa	neer and n, PO ₁₁ - P outcom PO ₈ FOO8 fonts, sheets: SS, back ent-side epetition PHP Bas Expressi ular Exp form Dat edirectir inction, for string attern m	society, roject ma es PO ₉ 1 1 1 1 comme Need for ground scriptin , Pop up ics, PHI ions, St ressions a, Dealin ng a forr Call by L rewrit match natching	PO7- Envinagement PO10 PO10 nting c r CSS, in images, ng with b boxes. P's Supp ring In s, Worki ng with n after s value a ing), Us ing wi in PHI	PO ₁₁ PO ₁₁ ode, controduction JavaSo ported terpola ng with Multi submiss and Ca ing Hi ith rep 2, Repla	PO1 2 2 color, ction s and cript, Data ation, h the value ssion. dl by dden gular acing		
PO12- Life-long 1 Course Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 2	Pe-Ethics, Learning PO1 2 ents:	PO ₉ - Inc Mapp PO ₂ 2 2 2 4 4 4 7 4 7 4 7 7 7 7 7 7 8 7 7 7 7 8 7 7 7 7	ividual of ping of of PO ₃ 2 2 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 2 2 1 – Rea 1 2 1 – Rea 1 2 1 – Rea 1 1 1 1 1 1 1 1 1 1 1 1 1	PO4 PO4 asonable asonable asonable cs of H ts, table syntax ntroduc ctions, to PHI ifiers, ctures, ating S nl Form nerating hat is ccursive panager cookies What is g a strin	vork, PO putcom PO5 2 2 2 2 2 2 2 7 7 7 7 7 7 7 7 8 7 8 7 8	Pho- Commession es with pro- PO6 PO6 gnifican formatti- ges, form ructure, o JavaScro ons, loop uage Fea es, Cons Strings a PHP: Cap ploaded ion, Defi- on. Jsing qu session r express a Regular	The enginumication program PO7 PO7 t; 3 – St ng and s. Style using C ript: Cli ps and re atures, stants, and Reg turing F form, R ine a fu ery strif n. PHF ssion, Pa	neer and n, PO ₁₁ - P outcom PO ₈ fonts, sheets: SS, back ent-side epetition PHP Bas Expressi ular Exp orm Dat edirectir inction, o	society, roject ma es PO ₉ 1 1 1 1 comme Need for ground scriptin , Pop up ics, PHI ions, St ressions a, Dealin ng a forr Call by L rewrit match natching	PO7- Envinagement PO10 PO10 nting c r CSS, in images, ng with b boxes. P's Supp ring In s, Worki ng with n after s value a ing), Us ing wi in PHI	PO ₁₁ PO ₁₁ ode, controduction JavaSo ported terpola ng with Multi submiss and Ca ing Hi ith rep 2, Repla	PO1 2 2 color, ction s and cript, Data ation, h the value ssion. dl by dden gular acing		

Unit: 5	MySQL:- PHP and MySQL: Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP Myadmin and database bugs.
Examination and Evalu	ation Pattern: It include both internal evaluation (30 marks) comprising two class
sessional exams/ assign	nments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which
is mainly end semester	examination.
Text Books:	
1 Beginning PHP an	d MySQL,W. Jason Gilmore, Apress, 2010, Fourth Edition.
2 Head First PHP &	MySQL, Lynn Beighley & Michael Morrison, First Edition, O'Reilly.
Reference Books:	
1 Developing Web A	Applications in PHP and AJAX, Harwani, McGraw Hill

2 PHP6 and MySQL, Steve Suehring, Tim Converse and Joyce Park, Wiley India 2010, Second Edition

Course Co	ode		Course Title						Lecture			Semester:			
MTCS325F	РСТ			Sof	t Comp	uting			L	Т	Р				
Version: 1.2			Date of	f Appro	<b>val:</b> 16tł	n BoS 17-	-11-2022		3	1	0				
1	Scheme o	of Instr	uction				S	cheme	of Exan	nina	tior	ı			
No. of	Periods	: 60	Hrs.					Ma	aximum	Sco	re	:	100		
Periods	/ Week	: 4						Inter	nal Eval	uatio	on	:	30		
	Credits	: 3							End Ser	nest	er				
Instructio	n Mode	: Lee	cture					E	xam Du						
Prerequisite(s)	: Algorith	nms and	l Progra	amming											
<b>Course Objecti</b>	ves:														
1. To introdu															
2. To familiar								cluster	ing tecl	nniq	ues.				
3. To learn th					n and it	s applica	ations.								
4. To acquire		<u> </u>	of roug	h sets.											
Course Outcor	nes (CO):									1					
COs No.				St	tateme	nt						oed Pro comes	ogram (POs)		
CO ₁	Identify building					; techniq	lues and	their r	oles in		]	PO ₁ , PO	$O_2$		
CO ₂		izzy log	gic and	reasoni	ng to ha	andle un	certaint	y and s	olve		РО	2, <b>PO</b> 3,	PO ₅		
CO ₃	Analyze	gene				combin	atorial	optimi	zation		]	PO ₂ , P	<b>O</b> 3		
	CO3Analyze genetic algorithms to combinatorial optimization problems.CO4Evaluate and compare solutions by various soft computing							t com	puting		]	PO ₂ , P	04		
<b>PO</b> ₁ - Engineerir investigations of sustainability, <b>PC</b>	approad g Knowle complex <b>9</b> 8- Ethics,	ches for edge, <b>P</b> e problem	<u>a giver</u> 0 ₂ - Pro s, <b>PO</b> 5-	n proble blem ar Modern	em. halysis, ž tool usa	<b>PO</b> 3- De	sign/dev The engi	elopmer neer and	nt of so d society	, <b>PO</b>	- Er	nvironn	nent and		
<b>PO</b> ₁ - Engineerir investigations of sustainability, <b>PC</b> <b>PO</b> ₁₂ - Life-long L	approad g Knowle complex <b>9</b> 8- Ethics,	ches for edge, <b>P</b> problem <b>PO</b> 9- Inc	• a giver O₂- Pro s, <b>PO</b> ₅- lividual o	n proble blem ar Modern or team v	em. halysis, tool usa vork, <b>PO</b>	<b>PO</b> 3- De	sign/dev The engi nunicatio	elopmer neer and n, <b>PO</b> 11- I	nt of so 1 society Project m	, <b>PO</b>	- Er	nvironn	nent and		
PO ₁ - Engineerir investigations of sustainability, PO PO ₁₂ - Life-long L Course Outcomes	approad g Knowle complex <b>9</b> 8- Ethics,	ches for edge, <b>P</b> problem <b>PO</b> 9- Inc	• a giver O₂- Pro s, <b>PO</b> ₅- lividual o	n proble blem ar Modern or team v	em. halysis, tool usa vork, <b>PO</b>	<b>PO</b> 3- De ge, <b>PO</b> 6- ' 910- Comm	sign/dev The engi nunicatio	elopmer neer and n, <b>PO</b> 11- I	nt of so 1 society Project m	, <b>PO</b>	7- Er gemo	nvironn	nent and		
PO ₁ - Engineerir investigations of sustainability, PC PO ₁₂ - Life-long L Course	approad og Knowle complex 08- Ethics, earning	ches for edge, Po problem PO ₉ - Inc Mapp PO ₂ 2	a given $O_2$ - Pros. $PO_5$ - dividual of $PO_3$	n proble blem ar Modern or team v course o	em. halysis, tool usa vork, <b>PO</b> putcom	<b>PO</b> ₃- Des ge, <b>PO</b> ₅- ' b₀- Comm es with <u>p</u>	sign/dev The engi nunicatio program	elopmer neer and n, <b>PO</b> 11- ] outcor	nt of sc l society Project m nes	r, <b>PO</b> r nanag	7- Er gemo	nvironn ent and	nent and finance,		
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PO ₁ - Engineerir investigations of sustainability, PC PO ₁₂ - Life-long L Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2 Unit: 3	approad g Knowle complex ; s- Ethics, earning PO1 2 ents:	ches for edge, P4 problem P09- Inc P09- Inc P02 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	a giver O ₂ - Pro s, PO ₅ - lividual o ping of o PO ₃ 2 2 2 1 - Re luction Compu gence: logic: 1 tions o nces, ations o bilistic ectures cial Neu cical ne iques fo- objecti ization	a proble blem ar Modern or team v course o PO4 2 asonable to soft titing C Machin Introduc on Fuzzy Defuzzi of Fuzzy orithms: search s, GA op ural Net ourons t or ANNs ive Opt proble	m. alysis, 1 tool usa vork, PO putcome PO₅ 2 2 computation constitute e Learn ction too y sets. F fication y logic. Concept technetic eratorss tworks: o proble s, Applic cimization ms (MCC	PO ₃ - De: ge, PO ₆ - es with p PO ₆ gnifican gnifican tting and ents, F ing fund b Fuzzy rel b Tuzzy rel b techni pts of Geniques, : Encodi Biologia lem solv cations o	sign/dew The enginunicatio program PO7 PO7 t; 3 – St d neural rom Co amenta ogic, Fu ations, 1 iques o enetics Basic ( ng, Cros cal neur ing, Diff f ANNs olem Sc nd issue	elopmen neer and n, PO ₁₁ - outcor PO ₈ rong netwo proventi ls. zzy set rules, p f Fuzz and Evo GA fra ssover, f ons an erent <i>A</i> to solve slving: es of so	nt of sciety Project n nes PO ₉ Project n nes PO ₉ rks: Evc onal A s and m ropositi y logic Diution n mework Selection d its wo NNs ar e some r Concep Diving t	PC PC PC PC PC PC PC PC PC PC PC PC PC P	p- Er gemo pho pho pon co pers imj pontr its : ad N ng, ectu life f m, , M	PO ₁₁ PO ₁₁ of Com of Com compu hip fui plication coller application Simula ures, T proble nulti-o ulti-O	PO12 PO12 puting: tational design, ation to ent GA n. ttion of 'raining ms. bjective		

	<b>mination and Evaluation Pattern:</b> It include both internal evaluation (30 marks) comprising two class ional exams/assignments/quiz/seminar presentation etc. and external evaluation (70 marks) which
	ainly end semester examination.
Text	t Books:
1	Jyh:Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, Neuro:Fuzzy and Soft Computing, Prentice:Hall
	of India, 2003.
2	George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic:Theory and Applications, Prentice Hall, 1995.
Refe	erence Books:
1	Luger G.F. and Stubblefield W.A. (2008). Artificial Intelligence: Structures and strategies for Complex
	Problem Solving. Addison Wesley, 6th edition.
2	Russell S. and Norvig P. (2009). Artificial Intelligence: A Modern Approach. Prentice-Hall, 3rd
	Edition.

Course Code MTCS326PCT		Course Title Lect						cture S			ester:		
		Deep Learning						L	Т	Р			
Version: 1.2		Date o		-	h BoS 17	-11-2022	2	3	1	0			
S	of Instru		••		Scheme of Exar					tior	1		
No. of F	: 60	Hrs.					Ma	ximum	Sco	re	:	100	
Periods/	: 4						Intern	al Eval	uatio	on	:	30	
(	: 3						E	nd Ser	nest	er	:	70	
Instructior		cture					Ex	am Du	iratio	on	:	3 Hrs.	
Prerequisite(s):		cs, Data	Scienc	e and N	lachine	Learnin	g						
Course Objectiv													
1. To introduc													
2. To demonst							ems.						
3. To apply the								:	: <b>r</b> _				
4. To acquire t		viedge a	ibout ti	ie impo	rtance	of deep i	earning	in real I	ne.				
Course Outcom COs No.	es(CO)			54	tatemer					м	onr	ed Pro	arom
COS NO.				31	latemer	11						comes	
CO ₁	Underg	tand th	ne dee	n lear	ning al	lgorithm	s which	h are	more			PO ₁ , PC	
						ning task							
						hms and					F	$PO_2, PC$	<b>)</b> 4
	problen		r	8							_	- 21	-
CO ₃	1		ncept a	nd evol	lution o	f deep le	arning.				PO	3, <b>PO</b> 5,	<b>PO</b> ₇
	Evaluat	e the de	ep lear	ning an	alyzing	algorith	ms.				I	PO2, PC	)4
sustainability, <b>PO</b> 8 <b>PO</b> 12- Life-long Le		PO9- Ind	ividual o	or team v	vork, <b>PO</b>	10- Comm	unicatio	n, <b>PO</b> 11- P	roject n	nanag	gemo	ent and	finance,
<b>_</b>		Марр	ing of c	course o	outcome	es with p	rogram	outcom	es				
Course	DO					es with p				DO		DO	<b>DO</b>
Course Outcomes	PO ₁	Mapp PO2	ing of c PO₃	PO4	PO ₅	es with p PO6	PO7	outcom PO ₈	es PO ₉	РО	10	<b>PO</b> 11	PO ₁₂
Outcomes CO ₁	<b>PO</b> ₁									РО	10	PO ₁₁	PO ₁₂
Outcomes CO ₁ CO ₂		PO ₂	PO ₃		PO ₅					PO	910	PO ₁₁	PO ₁₂
OutcomesCO1CO2CO3		<b>PO</b> ₂ 2 2		PO ₄						PO	910	PO ₁₁	PO ₁₂
Outcomes CO ₁ CO ₂		<b>PO</b> ₂	<b>PO</b> ₃	<b>PO</b> ₄	<b>PO</b> ₅	PO ₆	<b>PO</b> ₇	PO ₈		PO	910	PO ₁₁	PO ₁₂
Outcomes           CO1           CO2           CO3           CO4	2	<b>PO</b> ₂ 2 2	<b>PO</b> ₃	<b>PO</b> ₄	<b>PO</b> ₅		<b>PO</b> ₇	PO ₈		PO	910	PO ₁₁	PO ₁₂
OutcomesCO1CO2CO3	2	PO ₂ 2 2 2 2	PO ₃ 2 1 - Rec	PO ₄	<b>PO</b> ₅ 2 2 2; <b>2 - Si</b>	PO ₆	PO ₇ 1 t; 3 - St	PO ₈	PO9				
OutcomesCO1CO2CO3CO4	2	PO ₂ 2 2 2 Histor	<b>PO</b> ₃ 2 <b>1 - Rec</b>	PO ₄	<b>PO</b> ₅ 2 2; <b>2 - Si</b> arning,	PO ₆ gnifican Deep L	PO7 1 t; 3 - St	PO ₈	PO ₉	ries,	Mc	Culloc	h Pitts
OutcomesCO1CO2CO3CO4	2	PO ₂ 2 2 Histor Neuro	<b>PO</b> ₃ 2 <b>1 - Rec</b> ry of D on, Thr	PO ₄	<b>PO</b> ₅ 2 <b>2</b> arning, ing Log	PO ₆ gnifican Deep L gic, Perc	PO7 1 t; 3 – St earning	PO ₈ rong g Succes s, Perce	PO ₉	ries, Lea	Mc	Culloc ng Alg	h Pitts orithm
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conter	2	PO ₂ 2 2 Histor Neurc and C	<b>PO</b> ₃ 2 <b>1 - Rec</b> ry of D on, Thr	PO ₄	<b>PO</b> ₅ 2 <b>2</b> arning, ing Log	PO ₆ gnifican Deep L	PO7 1 t; 3 – St earning	PO ₈ rong g Succes s, Perce	PO ₉	ries, Lea	Mc	Culloc ng Alg	h Pitts orithm
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conter	2	PO ₂ 2 2 Histon Neurc and C MLPs	PO ₃ 2 1 - Rea ry of D on, Thr onverg	PO ₄	PO5 2 e; 2 - Si arning, ing Log Multilay	PO ₆ gnifican Deep L gic, Perc zer Perc	PO7 1 t; 3 – St earning ceptron eptrons	PO ₈ rong g Succes s, Perce s (MLPs)	PO ₉	ries, Lea reser	Mc rnii ntat	Culloc ng Alg ion Po	h Pitts orithm wer of
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conter	2	PO ₂ 2 2 Histor Neurc and C MLPs Sigmo	PO ₃ 2 1 - Rea ry of D on, Thr onverg	PO ₄ 1 usonable eep Le resholdi gence, N urons,	PO5 2 e; 2 - Si arning, ing Log Multilay Gradie	PO ₆ gnifican Deep L gic, Perc ver Perc ent Des	PO7 1 t; 3 – St earning ceptron eptrons scent,	PO ₈ rong g Succes s, Perce s (MLPs) Feed-fc	PO9 ss Stor ptron 0, Repr orward	ries, Lea reser	Mc rnin ntat	Culloc ng Alg ion Po al Net	h Pitts orithm wer of works,
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conter	2	PO ₂ 2 2 Histon Neurc and C MLPs Sigmo Repre	PO ₃ 2 1 - Rec ry of D on, Thr onverg bid Ne sentati	PO ₄ 1 asonable reshold gence, N urons, ion Po	PO5 2 e; 2 - Si arning, ing Log Multilay Gradio wer of	PO ₆ gnifican Deep L gic, Perc zer Perc	PO7 1 t; 3 – St ceptron eptrons scent, orward	PO ₈ rong g Succes s, Perce s (MLPs) Feed-fc Neural	PO9 ss Stor eptron 0, Repr orward Netw	ries, Lea reser	Mc rnii ntat eura	Culloc ng Alg ion Po al Net Feed-fo	h Pitts orithm wer of works, orward
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conter	2	PO ₂ 2 2 2 Histon Neurc and C MLPs Sigmo Repre Neura	PO ₃ 2 1 - Rec ry of D on, Thr onverg bid Ne sentati 1 Netw	PO ₄ 1 asonable eep Le resholdi gence, N curons, ion Pov vorks, D	PO5 2 e; 2 - Si arning, ing Log Multilay Gradiu wer of Back-p	PO ₆ gnifican Deep L gic, Perc ver Perc ent Des Feed-f	PO7 1 <i>t</i> ; 3 – St earning ceptron eptrons scent, orward ion, Gr	PO ₈ rong g Succes s, Perces s (MLPs) Feed-fc Neural adient	PO ₉ ss Stor eptron , Repr orward Netw Descer	ries, Lea reser Ne vorks	Mc rnii ntat eura s, H	Culloc ng Alg ion Po al Net Feed-fo , Mom	h Pitts orithm wer of works, prward entum
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histor Neurc and C MLPs Sigmo Repre Neura Based Adam	PO3 2 1 - Rea Ty of D on, Thr onverg oid Ne sentati 1 Netw GD, N , Eiger	PO ₄ 1 isonable eep Le esholdi gence, N iurons, ion Po- vorks, 1 Nestero nvalues	PO5 2 e; 2 - Si arning, ing Log Multilay Gradie wer of Back-p w Acce	PO ₆ gnifican Deep L gic, Perc ver Perc ent De Feed-f ropagati elerated eigenveo	PO7 1 t; 3 – St earning ceptron eptrons scent, orward ion, Gr GD, St ctors, I	PO ₈ rong g Succes s, Perces s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval	PO ₉ ss Stor eptron , Repr orward Netw Descer c GD, ue De	ies, Lea eser Ne vorks nt (C Ada econ	Mc rnin ntat eura s, H Gra npo	Culloc ng Alg ion Po al Net Feed-fa , Mom id, RM sition,	h Pitts orithm wer of works, orward entum (SProp, Basis,
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histor Neurc and C MLPs Sigmo Repre Neura Based Adam Princi	PO ₃ 2 1 - Rea ry of D on, Thr onverg oid Ne sentati il Netw GD, N , Eiger pal Co	PO ₄ 1 isonable eep Le esholdi gence, N urons, ion Pov vorks, 1 Nestero nvalues ompone	PO5 2 e; 2 - Si arning, ing Log Multilay Gradie wer of Back-p w Acce	PO ₆ gnifican Deep L gic, Perc ver Perc ent Dea Feed-f ropagat	PO7 1 t; 3 – St earning ceptron eptrons scent, orward ion, Gr GD, St ctors, I	PO ₈ rong g Succes s, Perces s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval	PO ₉ ss Stor eptron , Repr orward Netw Descer c GD, ue De	ies, Lea eser Ne vorks nt (C Ada econ	Mc rnin ntat eura s, H Gra npo	Culloc ng Alg ion Po al Net Feed-fa , Mom id, RM sition,	h Pitts orithm wer of works, orward entum (SProp, Basis,
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histor Neurc and C MLPs Sigmc Repre Neura Based Adam Princi Decor	PO ₃ 2 1 - Rec ry of D on, Thr onverg bid Net sentati l Netw GD, N , Eiger pal Co npositi	PO ₄ 1 usonable eep Le resholdi gence, N uurons, ion Pov vorks, I vorks, I vorks, J vorks, D vorks, D vorks, D vorks, D	PO ₅ 2 e; 2 - Si arning, ing Log Multilay Gradie wer of Back-p v Acce and o ent An	PO ₆ gnifican Deep L gic, Perc ver Perc ent Des Feed-f ropagati elerated eigenvec alysis a	PO7 1 t; 3 – St earning ceptron eptrons scent, forward ion, Gr GD, St ctors, I and its	PO ₈ rong g Succes s, Perce s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval interp	PO ₉ ess Stor eptron , Repr orward Netw Descer e GD, ue De retatio	ries, Lea eser Ne vorks nt (C Ada ecom	Mc rnin ntat eura s, H GD), Gra npo Sir	Culloc ng Alg ion Po al Net Feed-fo , Mom id, RM sition, ngular	h Pitts orithm wer of works, orward entum (SProp, Basis, Value
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histon Neurce and C MLPs Sigmo Repre Neura Based Adam Princi Decor Auto-	PO ₃ 2 1 - Rea ry of D on, Thr onverg bid Net sentati l Netw GD, N , Eiger pal Co npositi encode	PO ₄ 1 usonable eep Le resholdi gence, I vurons, ion Pov vorks, I vestero nvalues ompone on ers and	PO5 2 2 arning, ing Log Multilay Gradiu wer of Back-p ov Acce and o ent An	PO ₆ gnifican Deep L gic, Perc ver Perc ent Des Feed-f ropagati elerated eigenveo alysis a	PO7 1 t; 3 – St earning ceptron eptrons scent, forward ion, Gr GD, St ctors, I and its CA, Reg	PO ₈ rong g Succes s, Perce s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval interp ularizat	PO ₉ ess Stor eptron b, Repr orward Netw Descer c GD, ue De retation	ries, Lea eser Ne vorks at (C Ada ecom ons, auto	Mc rnin ntat eura s, H Gra npo Sir	Culloc ng Alg ion Po al Net Feed-fo , Mom d, RM sition, ngular	h Pitts orithm wer of works, orward entum SProp, Basis, Value rs, De-
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histon Neurce and C MLPs Sigmo Repre Neura Based Adam Princi Decor Auto- noisim	PO ₃ 2 1 - Rea ry of D on, Thr onverg oid Ne sentati il Netw GD, N , Eiger pal Co npositi encode	PO ₄ 1 usonable eep Le resholdi gence, I wurons, ion Pov vorks, I Nestero nvalues ompone ion ers and encod	PO5 2 2 arning, ing Log Multilay Gradiu wer of Back-p ov Acce and o ent An I relation	PO ₆ gnifican Deep L gic, Perc ver Perc ent Des Feed-f ropagati elerated eigenveo alysis a on to PC parse au	PO7 1 t; 3 – St earning ceptron eptrons scent, forward ion, Gr GD, St ctors, I and its CA, Reg to-ence	PO ₈ rong g Succes s, Perce s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval interp ularizatio	PO ₉ ess Stor eptron b, Repr orward Netw Descer c GD, ue De retation ion in contrac	ries, Lea eser Ne vorks nt (C Ada ecom ons, auto ctive	Mc rniin tat eura s, H GD), Gra npo Sir D-et e au	Culloc ng Alg ion Po al Net Feed-fa , Mom d, RM sition, ngular ncoder to-end	h Pitts orithm wer of works, orward entum SProp, Basis, Value cs, De- coders,
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histor Neurc and C MLPs Sigmo Repre Neura Based Adam Princi Decor Auto- noisin Bias	PO ₃ 2 1 - Rea ry of D on, Thr onverg bid Net sentati l Netw GD, N , Eiger pal Co npositi encode g auto Varian	PO ₄ 1 usonable resholdi gence, N urons, ion Pov vorks, N Nestero nvalues pompore on ers and -encod ce Tr	PO5 2 e; 2 - Si arning, ing Log Multilay Gradid wer of Back-p ov Acce and o ent An t relation lers, Sp adeoff,	PO ₆ gnifican Deep L gic, Perc ver Perc ent Dea Feed-f ropagati lerated eigenvec alysis a on to PC parse au L2 ro	PO7 1 t; 3 – St earning ceptron eptrons scent, orward ion, Gr GD, St ctors, I and its CA, Reg to-enco egulariz	PO ₈ rong g Succes s, Perce s (MLPs) Feed-fc Neural adient 1 ochastic Ligenval interp ularizat oders, C cation,	PO ₉ ss Store ptron , Repr orward Netw Descer c GD, ue De retation ion in Contrace Early	ries, Lea eser Ne vorks nt (C Ada ecom ons, auto ctive sto	Mc rnin ntat Gra po-ex au pppi	Culloc ng Alg ion Po al Net Geed-fo , Mom d, RM sition, ngular ncoder to-eno ng, I	h Pitts orithm wer of works, orward entum (SProp, Basis, Value rs, De- coders, Dataset
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histon Neurc and C MLPs Sigmo Repre Neura Based Adam Princi Decon Auto- noisin Bias augmo	PO ₃ 2 1 - Rea ry of D on, Thr onverg oid Ne sentati l Netw GD, N , Eiger pal Ca npositi encode g auto Varian entatio	PO ₄ 1 usonable resholdi gence, N urons, ion Pov vorks, N vorks, N vestero nvalues ompone on ers and -encod cce Tr n, Par	PO5 2 2 arning, ing Log Multilay Gradid wer of Back-p ov Acce and o ent An l relation lers, Sp adeoff, ameter	PO ₆ gnifican Deep L gic, Perc ver Perc ent Dea Feed-f ropagat elerated eigenveo alysis a on to PC parse au L2 ro sharin	PO7 1 t; 3 – St earning ceptron eptrons scent, orward ion, Gr GD, St ctors, I and its CA, Reg to-ence egulariz g and	PO ₈ PO ₈ rong g Succes s, Perce s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval interp ularizat oders, C ation, tying,	PO ₉ ss Stor ptron , Repr orward Netw Descer c GD, ue De retation ion in Contrac Early Injecti	ies, Lea eser Ne vorks nt (C Ada ecom ons, auto sto	Mc rnin ntat Gra poo Sir o-e: au oppi noi	Culloc ng Alg ion Po al Net Geed-fa , Mom id, RM sition, ngular ito-ena ito-ena ito-ena ing, I se at	h Pitts orithm wer of works, orward entum (SProp, Basis, Value cs, De- coders, Dataset input,
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histor Neurce and C MLPs Sigme Repre Neura Based Adam Princi Decor Auto- noisin Bias augme Ensen	PO3 PO3 2 1 - Rea y of D on, Thr onverge oid Network GD, N , Eiger pal Ca npositi encode g auto Varian entation	PO4 1 isonable eep Le esholdi gence, N works, I vorks, I v	PO5 2 2 arning, ing Log Multilay Gradid wer of Back-p w Acce and of ent An l relatic lers, Sp adeoff, ameter s, Dro	PO ₆ gnifican Deep L gic, Perc ver Perc ent Dea Feed-f ropagati elerated eigenvec alysis a on to PC parse au L2 ro sharin pout, C	PO7 1 t; 3 – St earning ceptron eptrons scent, orward ion, Gr GD, St ctors, I and its CA, Reg to-ence egulariz g and Greedy	PO ₈ rong g Succes s, Perces s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval interp ularization, cation, tying, Layer-v	PO ₉ ss Store eptron orward Descer c GD, ue De retation ion in contrace Early Injectii wise	ies, Lea eser Ne vorks nt (C Ada ecom ons, auto sto sto ng Pre-	Mc rnin ntat GD, Gra ppo Sir D-e: au pppi noi trai	Culloc ng Alg ion Po al Net Geed-fa , Mom id, RM sition, ngular ncoden to-ena ing, I se at ning,	h Pitts orithm wer of works, orward entum (SProp, Basis, Value cs, De- coders, Dataset input, Better
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histor Neurc and C MLPs Sigmo Repre Neura Based Adam Princi Decor Auto- noisin Bias augmo Ensen activa	PO ₃ 2 1 - Rea ry of D on, Thr onverg oid Ne sentati l Netw GD, N , Eiger pal Co npositi encode g auto Varian entation	PO4 1 isonable eep Le esholdi gence, N urons, ion Pov vorks, I Nestero nvalues ompone on ers and -encod ce Tr n, Par- nethods functio	PO5 2 2 arning, ing Log Multilay Gradid wer of Back-p w Acce and of ent An l relatic lers, Sp adeoff, ameter s, Dro	PO ₆ gnifican Deep L gic, Perc ver Perc ent Dea Feed-f ropagati elerated eigenvec alysis a on to PC parse au L2 ro sharin pout, C	PO7 1 t; 3 – St earning ceptron eptrons scent, orward ion, Gr GD, St ctors, I and its CA, Reg to-ence egulariz g and Greedy	PO ₈ PO ₈ rong g Succes s, Perce s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval interp ularizat oders, C ation, tying,	PO ₉ ss Store eptron orward Descer c GD, ue De retation ion in contrace Early Injectii wise	ies, Lea eser Ne vorks nt (C Ada ecom ons, auto sto sto ng Pre-	Mc rnin ntat GD, Gra ppo Sir D-e: au pppi noi trai	Culloc ng Alg ion Po al Net Geed-fa , Mom id, RM sition, ngular ncoden to-ena ing, I se at ning,	h Pitts orithm wer of works, orward entum (SProp, Basis, Value cs, De- coders, Dataset input, Better
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 Histor Neurc and C MLPs Sigmc Repre Neura Based Adam Princi Decor Auto- noisin Bias augmo Ensen activa Norm	PO ₃ 2 1 - Rea ry of D on, Thr onverg oid Ne sentati l Netw GD, N , Eiger pal Co npositi encode g auto Varian entation able n tion alizatic	PO ₄ 1 <b>isonable</b> eeep Le resholdi gence, N urons, ion Pov vorks, D vorks, D vorks, D vorks, D resteron vorks, D vorks, D	PO ₅ 2 e; 2 - Si arning, ing Log Multilay Gradie wer of Back-p ov Acce and c ent An l relation lers, Sp adeoff, ameter s, Droj ns, b	PO ₆ gnifican Deep L gic, Perc ver Perc ent Des Feed-f ropagati elerated eigenvec alysis a on to PC parse au L2 ro sharin pout, C etter	PO7 1 t; 3 – St earning ceptron eptrons scent, orward ion, Gr GD, St ctors, I and its CA, Reg to-ence egulariz g and Greedy weight	PO ₈ rong g Succes s, Perces s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval interp ularizat oders, C ation, tying, Layer-v initial	PO ₉ ss Stor eptron b, Repr orward Netw Descer e GD, ue De retation ion in contrace Early Injecti wise	ies, Lea eser Ne vorks at (C Ada econ ons, auto ctive sto ng Pre- n	Mc rnin tat eura s, H Gra poo Sir oppi noi trai neth	Culloc ng Alg ion Po al Net Feed-fo , Mom id, RM sition, ngular ncoder to-eno ing, I se at ning, nods,	h Pitts orithm wer of works, orward entum (SProp, Basis, Value rs, De- coders, Dataset input, Better Batch
Outcomes CO1 CO2 CO3 CO4 Detailed Conter Unit: 1	2	PO ₂ 2 2 2 2 Histon Neurce and C MLPs Sigmo Repre Neura Based Adam Princi Decor Auto- noisin Bias augmo Ensen activa Norm Learn	PO ₃ 2 1 - Rec ry of D on, Thr onverg oid Ne sentati l Netw GD, N , Eiger pal Co npositi encode g auto Varian entation ble n tion alizatic ing Vo	PO ₄ 1 <b>isonable</b> eeep Le resholdi gence, N rurons, ion Pov vorks, N vorks,	PO5 2 2 arning, ing Log Multilay Gradie wer of Back-p ov Accee and o ent An I relatio lers, Sp adeoff, ameter s, Drojons, b	PO ₆ gnifican Deep L gic, Perc ver Perc ent Dea Feed-f ropagati elerated eigenvec alysis a on to PC parse au L2 ro sharin pout, C	PO7 1 t; 3 – St t; 3 – St to-st to-st to-st to-st to-st to-st to-ence g and treedy weight tions o	PO ₈ PO ₈ rong g Succes s, Perces s (MLPs) Feed-fc Neural adient 1 ochastic Eigenval interp ularizat: oders, C ation, tying, Layer-v initiali	PO ₉ ss Stor eptron b, Repr orward Netw Descer c GD, ue De retation ion in contrace Early Injecti wise 1 ization	ies, Lea eser Ne vorks at (C Ada ecom ons, auto ctive sto ing Pre- m m onvo	Mc rnin tat eura s, H Gra ppo Sir D-er au oppi noi trai neth luti	Culloc ng Alg ion Po al Net Feed-fo , Mom id, RM sition, ngular ncoder to-end ing, I se at ning, nods, onal	h Pitts orithm wer of works, orward entum (SProp, Basis, Value rs, De- coders, Dataset input, Better Batch Neural

	Unit: 5	Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Fooling Convolutional Neural Networks, Recurrent Neural Networks, Backpropagation Through Time (BPTT), Vanishing and Exploding Gradients, Truncated, BPTTGated Recurrent Units (GRUs), Long Short-Term Memory (ISTM) Cells, Solving the vanidhing gradient problem with LSTMs						
sessi	Memory (LSTM) Cells, Solving the vanidhing gradient problem with LSTMs. <b>Examination and Evaluation Pattern:</b> It include both internal evaluation (30 marks) comprising two class sessional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester examination.							
	Books:							
1	Goodfellow, I., Ber	ngio,Y., and Courville, A., Deep Learning, MIT Press, 2016.						
Refe	rence Books:							
1	Bishop, C. ,M., Patt	tern Recognition and Machine Learning, Springer, 2006.						
2	Yegnanarayana, B.	, Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.						

Course Coo	Course Title Lec							cture			ester:										
MMCA327P	Web Mining							L	Т	Р											
Version: 1.2		Date of			h BoS 17-11-2022 3					0											
S	f Instru	uction			Scheme of Exar					tion	l										
No. of I	Periods	: 60	Hrs.					Ma	ximum	Sco	re	:	100								
Periods/	'Week	: 4						Intern	al Eval	uatio	on	:	30								
(	: 3					E	nd Ser	nest	er	:	70										
Instructior	n Mode	: Lecture						Ex	am Du	ratio	on	:	3 Hrs.								
Prerequisite(s):	Discrete	e Mathe	matics	and Sta	itistics																
Course Objectiv																					
1. To understa			0					eb minin	g.												
2. To learn diff																					
3. To apply the																					
4. To analyze V		ing stra	itegies	and algo	orithms	in their	workpla	ice or re	esearch	ı car	eer.										
Course Outcom	es (CO):											1.5									
COs No.				St	atemer	nt				Mapped Program											
	IIndana	- and 41-		Contral	minim	and Det		~		Outcomes (POs)											
						and Dat				PO ₁ , PO ₂											
				0		online re						$PO_3$	-								
CO ₃	Apply W researcl		0	itegies	and algo	orithms	in their	workpla	ce or		1	PO ₃ , PO	5								
CO ₄				ince ind	lay and	rank we	h doour	onta			pΩ	3, PO4, I	20.								
PO ₁ - Engineering		doe <b>P</b>	b- Prol	olem an	alvsis I	$\mathbf{D}_{0}$ Des	ign /dev	elonment	ofso	lutio		, ,									
investigations of c																					
sustainability, PO8	- Ethics, I																				
PO12- Life-long Le	arning																				
	1	Марр	ing of c	ourse o	utcome	es with p	rogram	outcom	es												
Course	PO ₁	$PO_2$	PO ₃	PO ₄	PO ₅	PO ₆	<b>PO</b> ₇	PO ₈	PO ₉	РС	10	<b>PO</b> ₁₁	<b>PO</b> ₁₂								
Outcomes				1		0	,	0	0		10	11	12								
<u>CO1</u>	2	2	-																		
CO ₂			2		-																
<u>CO3</u>			2	1	2	-			4												
CO ₄			2	1					1												
Detailed Contor	4		1 – Rea	sonable	; z – sų	gnificant	t; 3 – Sti	rong													
Detailed Conter	its:	Introd		4 a 147 a la	Data N	lining	d Data	Minimat	Darra d			. <b>.</b>	ation								
						lining ar Brief His															
		Mining-Data Mining, Web Mining. Data Mining Foundations – Association Rules																			
	Unit: 1			and Sequential Patterns – Basic Concepts of Association Rules, Apriori Algorithm- Frequent Itemset Generation, Association, Rule, Generation, Data Formats, for																	
Unit: 1			ent Itei	nset Ge	eneratio	on. Asso			nerati	Frequent Itemset Generation, Association Rule Generation, Data Formats for Association Rule Mining, Mining with multiple minimum supports – Extended											
Unit: 1		Frequ					ciation	Rule Ge				s – Ex									
Unit: 1		Freque Associ	iation F	Rule Mir	ning, M	ining wi	ciation th mult	Rule Ge iple min	imum	supp	port		tended								
Unit: 1		Freque Associ Model	iation F I, Minin	tule Mir g Algori	ning, M thm, Ru	ining wi ıle Gene	ciation th mult ration, N	Rule Ge iple min ⁄lining C	imum lass As	supj ssoci	port atio	n Rule	tended								
Unit: 1		Freque Associ Model Conce	iation F l, Minin epts of S	Rule Mir g Algori Sequent	ning, M thm, Ru ial Patte	ining wi	ciation th mult ration, M ning Seq	Rule Ge iple min ⁄lining C uential l	imum lass As Patterr	supj ssoci is on	oort atio GS	n Rule: P,	tendec s, Basic								
Unit: 1		Freque Associ Model Conce Super	iation F l, Minin epts of S vised a	Rule Mir g Algori Sequent nd Unsi	ning, M thm, Ru ial Patte upervise	ining wi ıle Gene erns, Mir	ciation th mult ration, M ning Seq ning Sup	Rule Ge iple min ⁄lining C uential l ervised	imum lass As <u>Patterr</u> Learni	supj ssoci is on ng -	oort atio GS - Ba	n Rule: P, sic Co	tendeo s, Basio ncepts								
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Unit: 1 Unit: 2		Freque Associ Model Conce Super Decisi Contin Cover Classi	iation F l, Minin epts of S vised an on Tree nuous ing, Ru fication	Rule Mir g Algori Gequent and Unsu e Induc Attribut le Learn , Naïve	ning, M ithm, Ru ial Patte upervise tion – I tes, Cla ning, Cl Bayesi	ining wi ile Gene erns, Mir ed Learr Learning assifier lassificat an Text	ciation th mult ration, M ning Seq ning Sup ding ding ding ding ding ding ding ding	Rule Ge ple min Aining C <u>uential l</u> ervised hm, Imp on, Ru ed on A ication	imum Elass As <u>Patterr</u> Learni ourity le Ind ssocia – Prol	supj ssoci is on ng - Func uctio tions babil	oort atio <u>GS</u> - Ba tion on s, Na istic	n Rules <u>P,</u> sic Co a, Hanc – Seq aïve Ba c Fram	tendec s, Basic ncepts lling o juentia ayesiar nework								
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		Freque Associ Model Conce Super Decisi Contin Cover Classi Naïve Cluste	iation F pts of S vised an on Tree nuous ing, Ru fication Bayesi ering –	tule Mir g Algori <u>Sequent</u> nd Unsu e Induc Attribut le Learr , Naïve an Moo K-mea	ning, M ithm, Ru ial Patte upervise tion – I tes, Cla ning, Cl Bayesi del. Un ans Alg	ining wi ile Gene erns, Mir ed Learn Learning assifier lassificat an Text supervis gorithm,	ciation th multi ration, M ning Seq ning Sup g Algorit Evaluati ion Bas c Classif sed Lea	Rule Ge iple min Aining C <u>uential l</u> ervised hm, Imp ion, Ru ed on A ication rning –	imum Patterr Learni ourity le Ind ssocia – Prol Basic	supp soci is on ng - Func uctions tions babil Co	oort atio <u>GS</u> - Ba tion on s, Na istic ncej	n Rules P, sic Co , Hanc – Seq aïve Ba c Fram ots, K-	tendec s, Basic ncepts lling of luentia ayesian nework -means								
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		Freque Associ Model Conce Super Decisi Contin Cover Classi Naïve Cluste Cluste Inform	iation F l, Minin epts of <u>S</u> vised a on Tree nuous ing, Ru fication Bayesi ering – ering, St nation F	tule Mir g Algori Gequent of Unsr e Induc Attribut le Learn , Naïve an Moo K-mea rength Retrieva	ning, M thm, Ru ial Patte upervise tion – I tes, Cla ning, Cl Bayesi del. Un ans Alg and We I and W	ining wi ile Gene erns, Min ed Learn Learning assifier lassificat an Text supervis gorithm, eakness. /eb Sear	ciation th multi ration, M ning Seq ning Sup g Algorit Evaluati con Bas classif ced Lea Repres	Rule Ge iple min Aining C uential I ervised hm, Imp ion, Ru ed on A ication rning – entatior	imum Class As Patterr Learni Durity D le Ind Issocia – Prol Basic n of C  pts of	supj soci ng - Func uctions tions babil Co Clust	oort atio GS - Ba tion on s, Na istic ncep ers, cmat	n Rule: P, sic Co , Hand – Seq aïve Ba c Fram ots, K- Hiera	tendec s, Basic ncepts lling of juential ayesian ework -means archical								
Unit: 2		Freque Associ Model Conce Super Decisi Contin Cover Classi Naïve Cluste Cluste Inform Inform	iation F l, Minin epts of <u>S</u> vised a on Tree nuous ing, Ru fication Bayesi ering – ering, St nation F nation	tule Mir g Algori Gequent nd Unsr e Induc Attribut le Learn , Naïve an Moo K-mea rength Retrieva Retrieva	ning, M thm, Ru ial Patte upervise tion – I tes, Cla ning, Cl Bayesi del. Un ans Alg and We I and We	ining wi ile Gene erns, Mir ed Learn Learning assifier lassificat an Text supervis gorithm, akness. /eb Sear nods –	ciation th multi- ration, M ning Seq ning Sup g Algorit Evaluati- con Bas classif ced Lea Repres ch: Basia Boolean	Rule Ge iple min Aining C uential I ervised hm, Imp ion, Ru ed on A ication rning – entatior c Conce Model	imum Class As Patterr Learni Durity D le Ind ssocia – Prol Basic n of C pts of Vector	supj soci is on ng - Func uctions tions babil Co Clust	ort atio <u>GS</u> - Ba tion on s, Na istic ncep ers, rmat	n Rule: P, sic Co , Hand – Seq aïve Ba e Fram ots, K- Hiera tion Re e Mod	tended s, Basic ncepts, dling of juential ayesian ework, -means archical ctrieval, lel and								
		Freque Associ Model Conce Super Decisi Contin Cover Classi Cluste Cluste Inform Inform Statist	ation F , Minin pts of S vised at on Tree nuous ing, Ru fication Bayesi ering, St ration F nation ical Lat	tule Mir g Algori Gequent nd Unsi e Induc Attribut le Learn , Naïve an Moo K-mea rength Retrieva Retrieva nguage	ning, M thm, Ru upervise tion – I tes, Cla ning, Cl Bayesi del. Un ans Alg and We I and W al Meth Model,	ining wi ile Gene erns, Min ed Learn Learning assifier lassificat an Text supervis gorithm, eakness. Veb Sear nods – Relevand	ciation th multi- ration, M ning Seq ning Sup g Algorit Evaluati- con Bas c Classif sed Lea Repres ch: Basic Boolean ce Feedl	Rule Ge iple min Aining C uential I ervised hm, Imp ion, Ru ed on A ication rning – entatior c Conce Model, pack, Ev	imum Class As Patterr Learni purity D le Ind ssocia – Prol Basic n of C pts of Vecto aluatio	supj ssoci as on ng - Func uctions tions cabil Co Clust Infor Dr S n Me	port atio <u>GS</u> - Ba tion on s, N istic ncep ers, cmat pace	n Rule: P, sic Co a, Hand – Seq aïve Ba e Fram ots, K- Hiera tion Re e Mod ures, Te	tendec s, Basic ncepts lling of juential ayesian ework means trichical etrieval lel and ext and								
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	Inverted Index, Search using Inverted Index, Index Construction, Index
	Compression, Latent Semantic Indexing – Singular Value Decomposition, Query
Unit: 4	Link Analysis and Web Crawling: Link Analysis – Social Network Analysis, Co- Citation and Bibliographic Coupling, Page Rank Algorithm, HITS Algorithm, Community Discovery-Problem Definition, Bipartite Core Communities, Maximum Flow Communities, Email Communities. Web Crawling – A Basic Crawler Algorithm- Breadth First Crawlers, Preferential Crawlers, Implementation Issues – Fetching, Parsing, Stopword Removal, Link Extraction, Spider Traps, Page Repository, Universal Crawlers, Focused Crawlers,
Unit: 5	Opinion Mining and Web Usage Mining Opinion Mining – Sentiment Classification – Classification based on Sentiment Phrases, Classification Using Text Classification Methods, Feature based Opinion Mining and Summarization – Problem Definition, Object feature extraction, Feature Extraction from Pros and Cons of Format1, Feature Extraction from Reviews of Format 2 and 3, Comparative Sentence and Relation Mining, Web Usage Mining – Data Collection and Preprocessing– Sources and Types of Data, Key Elements of Web usage Data Preprocessing, Data Modeling for Web Usage Mining, Discovery
Examination and Evalua	tion Pattern: It include both internal evaluation (30 marks) comprising two class
	ments/quiz/seminar presentation etc. and external evaluation (70 marks) which
is mainly end semester e	
Text Books:	
1 Web Data Mining: E	Exploring Hyperlinks, Contents, and Usage Data by Bing Liu (Springer Publications)
2 Mining the Web: Dis	scovering Knowledge from Hypertext Data by Soumen Chakrabarti
Reference Books:	
1 Data Mining: Conc Publications)	epts and Techniques, Second Edition Jiawei Han, Micheline Kamber (Elsevier
2 Web Mining: Applic	cations and Techniques by Anthony Scime

Course Code										ture	Semester	
MMCA328PET Version: 1.2 Scheme of		Natural Language Processing Date of Approval: 16th BoS 17-11-2022							L 3	T P 1 0	III	
				Approv	val: 16th	1 805 17-		1 0 minatio				
No. of P		-					3		aximun		n   .	100
	: 60 Hrs.							nal Eva		•	30	
Periods/Week Credits		: 4						End Se		•	70	
Instruction			cture						Linu Se		•	3 Hrs
Prerequisite(s):			cture					E		liation	•	51115
Course Objectiv		atics										
. To understa		asic Co	ncents	of Natu	ral Lan	ouade Di	rocessin	ď				
2. To demonstr							000035111	5.				
3. To apply of t						ues.						
4. To analyze th						anslatio	n.					
Course Outcome		<u>urear</u> ar	prouen			anoratio						
COs No.				St	atemer	nt				Map	ped Pro	ogram
											(POs)	
CO ₁	Explain	the app	oroache	es to syr	ntax and	l semant	tics in N	LP.			PO ₁ , PC	<u> </u>
	Analyze					eneratio		ogue	and		PO ₂	
	summai				3			0				
CO ₃	Illustrat	e the	metho	ds for	statisti	cal appi	roaches	to ma	achine		PO ₃	
	translat	ion.										
CO ₄	Apply M	Machin	e learn	ing tec	chnique	s and 1	nodels	for Ma	achine		PO ₃ , PO	)5
	Translat	tion.										
Course Outcomes	PO ₁	PO ₂	PO ₃	<b>DO</b>		70		50		DO	<b>PO</b> ₁₁	PO ₁
		102	PU ₃	$PO_4$	PO ₅	$PO_6$	<b>PO</b> ₇	PO ₈	PO ₉	<b>PO</b> ₁₀	PU	PU1
	2		PO ₃	<b>PO</b> ₄	PO ₅	PO ₆	<b>PO</b> ₇	PO ₈	PO ₉	<b>PO</b> ₁₀	PO	FU
CO ₁	2	2	PO3		PO ₅	PO ₆	<b>PO</b> ₇	PO ₈	PO ₉	PO ₁₀	ron	
CO ₁ CO ₂	2				PO5		<b>PO</b> ₇	PO ₈	PO ₉			
CO ₁ CO ₂ CO ₃	2	2	2 2		<b>PO</b> ₅		PO ₇		PO ₉			
CO ₁ CO ₂	2	2	2 2 2		2				PO ₉			
CO ₁ CO ₂ CO ₃ CO ₄		2	2 2 2		2	PO ₆			PO ₉			
CO ₁ CO ₂ CO ₃ CO ₄		2 2	2 2 <b>1 - Rea</b>	usonable	2 2; <b>2 - Si</b> g	gnifican	t; 3 – Sti	rong				
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CO1 CO2 CO3 CO4 Detailed Conten		2 2 Intro "lingu	2 2 <b>1 - Rea</b> duction istics vi	sonable: Introdew" (co	2 ;; <b>2 – Si</b> ç	<b>gnifican</b> to the M ional ling	t; <b>3 – St</b> r	r <b>ong</b> pgy, Syr	ntax, Se	mantics	by link	king th
CO1 CO2 CO3 CO4 Detailed Conten		2 2 Introd "lingu (natur Morp	2 2 <b>1 – Rea</b> duction istics vi "al langu hology:	sonable: Introd ew" (co lage pro Analysi	2 ;; 2 – Sig luction mputati ocessing is and g	g <b>nifican</b> to the M ional ling g). ;eneratio	t; <b>3 – St</b> forpholo guistics)	rong gy, Syr with th nguage	ntax, Se ne "artif	mantics icial inte	by link elligence	ting the view
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Text	t Books:
1	Daniel Jurafsky, James H. Martin "Speech and Language Processing" Second Edition, Prentice Hall,
	2008.
2	Tanvier Siddiqui: Natural Language Processing and Information Retrieval, U.S. Tiwary
Refe	erence Books:
1	Allen, James, Natural Language Understanding, Second Edition, Benjamin/Cumming, 1995.
2	C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing", MIT Press.
	Cambridge, MA:,1999