# Learning Outcomes based Curriculum Framework (LOCF)

# for

# Master of Technology Computer Science and Engineering (Artificial Intelligence and Machine Learning)

Part-time program under sponsored/self-finance mode (Duration 3 Years)

(w.e.f. 2023-24)



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

### **University Profile**

Maulana Azad National Urdu University (MANUU) is a Central University, established byan Act of Parliament in 1998 with all India jurisdiction. The headquarters and main campusof MANUU is in Gachibowli, Hyderabad. It is spread over 200 acres. MANUU is recognized as a major higher education service provider across the remote areas of the country in Urdu Medium through its regular and distance mode programs. MANUU commenced with distance education programs in 1998 and consolidated its regular academic and research programs in 2004.

The University is named after Maulana Abul Kalam Azad, a scholar par excellence, a prolificwriter, an inimitable orator, a gallant freedom fighter, a visionary of the post independent Indian education system and an architect of technical and scientific education in Independent India.

Presently, MANUU is in the process of consolidating the existing institutions, while expanding it to reach the unreached through various intervention measures. Further, to meet the rising aspirations of its youth in general and Urdu speaking community in specific, the University is making considerable progress in all fronts of academics, research and governance with specific vision, mission and objectives.

### School Profile

School of Technology (formerly School of Computer Science and Information Technology), was established in 2014 with the objective to create a congenial environment for inspiring students, retaining outstanding teachers, providing quality teaching and developing cutting-edge technology for technological intervention. The school is currently having one Department viz., The Department of Computer Science & Information Technology. The school also comprises of five Polytechnics located at Hyderabad, Bengaluru, Darbhanga, Kadapa and Cuttack.

Department of Computer Science and Information Technology was established in 2006 with the aim to impart quality education and achieve the vision of excellence in the field of Computer Science, IT and interdisciplinary research. Presently, Department of Computer Science and Information Technology offering B.Tech. (Computer Science), M.Tech. in Computer Science and MCA (two-years) programmes all approved by the All India Council for Technical Education (AICTE). Department also provide options of Lateral entry into second year of B.Tech. (Computer Science) for Polytechnic students

Department of Computer Science and Information Technology provide an excellent learning environment with dedicated young faculty members, state-of-the-art laboratories and innovative academic processes. We focus on providing an in-depth knowledge in the field of Artificial Intelligence, Personalized learning, Machine learning, Computational sustainability, Block chain technology, semantic web, internet of things (IoT) and other allied fields of computer science & IT. We aspire our students towards becoming next generation IT professionals capable of generating programming and logical skills, providing networking solutions and becoming leaders in software industry, government and academia.

#### Vision and Mission 1.

### 1.1 Vision

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

#### Mission 1.2

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:

- To create an ambiance for healthy teaching-learning process and attract the motivated 1. 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

### MAULANA AZAD NATIONAL URDU UNIVERSITY SCHOOL OF TECHNOLOGY DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

### M.Tech. Computer Science and Engineering (Artificial Intelligence and Machine Learning) Part-time program under sponsored/self-finance mode

### **Course structure & Semester-wise credit distribution**

<b>A</b> .	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 80 credits to be eligible to get Post Graduate degree in Computer Science.

C. Stru	cture of Post graduate Computer Science prog	ram:		
S. No.	Course Type	Credit Breakup for M.Tech.	Credits	
5. NO.	course rype	Part time Students	Creates	
1	Program Core Course	PC	20	
2	Program Elective Course	PE	24	
3	Research Methodology & IPR	RMIPR	4	
5	Laboratory	LAB	8	
6	Seminar Presentation & Comprehensive viva-	SPC	2	
	voce			
7	Dissertation	DISS	22	
	Total		80	

### MAULANA AZAD NATIONAL URDU UNIVERSITY DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTIONS, EXAMINATION & EVALUATION

(Effective for Batch Admitted from 2023-24 Academic Year)

### M.Tech. Computer Science and Engineering (Artificial Intelligence and Machine Learning) Part-time program under sponsored/self-finance mode

Total Credits (3 Year Course): 80

			Ma				
Course Code	Course Title	Course Type	Internal Assessment	Semester Exam	Total	L-T-P	Credits
MTCS111PCT	Advanced Algorithm	PC	30	70	100	4-0-0	4
MTCS112PCT	Artificial Intelligence	PC	30	70	100	4-0-0	4
MTCS111RMT	Research Methodology & IPR	RMIPR	30	70	100	4-0-0	4
MTCS160PCP	Lab- I Advanced Algorithm Lab	LAB	50	50	100	0-0-4	2
		Total		1	400	12-0-4	14

### Semester – I

## Semester – II

		Course	Ν	Marks			
Course Code	Course Title	Туре	Internal Assessment	Semester Exam	Total	L-T-P	Credits
MTCS211PCT	Machine Learning with Python	PC	30	70	100	4-0-0	4
MTCS22XPET	Program Elective-1	PE	30	70	100	4-0-0	4
MTCS23XPET	Program Elective-2	PE	30	70	100	4-0-0	4
MTCS260PCP	Lab – II Python Lab	LAB	50	50	100	0-0-4	2
MTCS21XNGT	Audit Course	AC	15	35	50	2-0-0	Non- Credit
	Tota	al			450	14-0-4	14

## Semester - III

		Marks						
Course Code	Course Title	Course Type	Internal	Semester	Total	L-T-P	Credits	
			Assessment	Exam				
MTCS311PCT	Deep Learning	PC	30	70	100	4-0-0	4	
MTCS34XPET	Program Elective -3	PE	30	70	100	4-0-0	4	
MTCS35XPET	Program Elective -4	PE	30	70	100	4-0-0	4	
MTCS360PCP	Lab – III Deep Learning	LAB	50	50	100	0-0-4	2	
	Lab							
	То	tal			400	12-0-4	14	

## Semester – IV

Course Code	Course Title	Course Type	Internal Assessment	Semester Exam	Total	L-T-P	Credits
MTCS411PCT	Internet of Things	РС	30	70	100	4-0-0	4
MTCS46XPET	8	PE	30	70	100	4-0-0	4
MTCS47XPET	Program Elective -6	PE	30	70	100	4-0-0	4
MTCS460PCP	Lab – IV IoT Lab	LAB	50	50	100	0-0-4	2
	1	Total		1	400	12-0-4	14

## Semester – V

			]	Marks			
Course Code	Course Title	Course Type	Internal	Semester	Total	L-T-P	Credits
			Assessment	Exam			
MTCS511PCP	Seminar Presentation &	SPC	30	70	100	0-0-4	2
	Comprehensive viva-						
	voce						
MTCS570PCP	Dissertation- Part 1	DISS	210	490*	700	0-0-20	10
	(Minor)						
	То	tal		•	800	0-0-24	12

\* Viva-voce will be evaluated by DRC

# Semester – VI

Gaura Gala	Course Title	Course		arks		LTD	Creatite.
Course Code	Course Title	Туре	Internal Assessment	Semester Exam	Total	L-T-P	Credits
MTCS670PCP	Dissertation- Part 2 (Major)	DISS	240	560	800	0-0-24	12
	Т	'otal			800	0-0-24	12

**L-T-P** stands for number of contact hours as Lecture-Tutorial-Practical in a week.

# **PROGRAM ELECTIVES (PE)**

	SEN	1ESTER – 2					
Pro	ogram Elective – I	P	rogram Elective – II				
Course Code	Course Title	<b>Course Code</b>	Course Title				
MTCS211PET	Expert System	MTCS221PET	Augmented Reality and Virtual Reality				
MTCS212PET	Intelligent System	MTCS222PET	Pattern Matching and Object Recognition				
MTCS213PET	Knowledge Representation	MTCS223PET	Computer Vision				
MTCS214PET	Human Computer Interface	MTCS224PET	Dependable AI				
MTCS215PET	Text Mining	MTCS225PET	Digital Image Processing and Analysis				
	Audi	t Course					
	Course Code	Course Title					
Ν	ATAC211PET	English for Researc	h Paper Writing				
Ν	ATAC212PET	Value Education					
Ν	/ITAC213PET	Pedagogy Studies					
Ν	/ITAC214PET	Stress Managemen	t by Yoga				
Ν	ATAC215PET	Tarseel-e-Urdu/El	ementary Urdu				
	SEM	ESTER - 3					
Pro	gram Elective – III	Program Elective – IV					
Course Code	Course Title	Course Code	Course Title				
MTCS331PET	Artificial Neural Networks	MTCS341PET	Blockchain Technology				
MTCS332PET	Big Data	MTCS342PET	Intelligent Bioinformatics				
MTCS333PET	Robotics Process Automation	MTCS343PET	Digital Image Analysis				
MTCS334PET	Speech and Natural Language Processing	MTCS344PET	Edge and Fog Computing				
MTCS335PET	Information Retrieval and Web Mining	MTCS345PET	Computational Optimization				
	SEM	ESTER - 4					
Pro	gram Elective – V	Pr	ogram Elective – VI				
Course Code	Course Title	Course Code	Course Title				
MTCS451PET	Cloud Computing	MTCS461PET	Graphics Processing Unit Computing				
MTCS452PET	Wireless Access Technologies	MTCS462PET	Statistical Data Analysis				
MTCS453PET	Algorithms for Big Data	MTCS463PET	Embedded System				
MTCS454PET	Advanced Computer Graphics	MTCS464PET	Advanced Wireless & Mobile Networks				
MTCS455PET	Data Visualization	MTCS465PET	Soft Computing				

	ode				Course					ture	-	
MTCS111F	PCT		-			lgorithm			L	-	Semester: I	
Version: 1.2	~ 1			e of App	roval: 16	th BoS 17-	11-2022	~ 1	4 (			
		e of Inst						Scheme of			100	
	Periods		Hrs.						Maximur		: 100	
Periods	S/Week	: 4				Internal Evaluation:30End Semester:70						
Instructio	Credits		cture						End Se Exam D		: 70 : 3 H	ra
Prerequisite(s									Exam D	uration	. эп	18.
Course Object			ngn									
l. To learn a		riate stra	ntegy to g	solve a p	roblem							
2. To devise						tructures.						
3. To design								for differ	ent kinds	of prob	lems.	
4. To gain kn	•	-		0						1		
Course Outco					/ -		1					
COs No.					Statem	nent				Ma	pped Pro	gram
											itcomes (	
CO <sub>1</sub>	Understa	ind the F	rogrami	ning Pro	blem Sta	atements	for Algoritl	nms.		P	<b>O</b> <sub>1</sub> , <b>PO</b> <sub>2</sub> ,	PO <sub>4</sub>
CO <sub>2</sub>	Understa	ind the r	lecessar	y mather	natical a	bstraction	n to solve				<b>PO</b> <sub>2</sub> , <b>PO</b>	<b>D</b> 4
	problems				-	-						
CO <sub>3</sub>	Analyze t	he Effici	ency and	d Proofs	of Corre	ectness in	Algorithms	5			PO <sub>3</sub> , PO	<b>D</b> 5
CO <sub>4</sub>	Compreh	nend and	d select	algorith	m desig	gn approa	aches in a	problem	n specifi	2 <b>P</b> (	<b>D</b> <sub>4</sub> , <b>PO</b> <sub>9</sub> ,	PO <sub>12</sub>
	manner.			0	· · · ·	5 11		1	1		, .,	
PO <sub>1</sub> - Enginee	ering Kno	owledge,	<b>PO</b> <sub>2</sub> -	Problem	analys	is, <b>PO</b> 3-	Design/d	evelopme	nt of s	olutions,	<b>PO</b> <sub>4</sub> - (	Conduc
investigations												
sustainability,			· Individu	ual or tea	am work	, <b>РО</b> 10- Сс	ommunicat	ion, <b>PO</b> 11-	Project i	nanagen	nent and t	finance
PO12- Life-lon	g Learnin	g										
			Map	ping of	course o	nutcomes	with near	am outco	mor			
				1 0	course o	Jucomes	with progr		mes			
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>2</sub>							PO10	PO	PO
Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO <sub>11</sub>	PO <sub>12</sub>
Outcomes CO <sub>1</sub>	<b>PO</b> <sub>1</sub>	2	PO <sub>3</sub>	<b>PO</b> <sub>4</sub>						PO <sub>10</sub>	PO <sub>11</sub>	PO
Outcomes           CO1           CO2				PO <sub>4</sub>	PO <sub>5</sub>					PO <sub>10</sub>	PO <sub>11</sub>	PO
Outcomes           CO1           CO2           CO3		2	<b>PO</b> <sub>3</sub>	<b>PO</b> <sub>4</sub> 3 2					PO <sub>9</sub>	PO <sub>10</sub>	PO <sub>11</sub>	PO
Outcomes           CO1           CO2		2	2	<b>PO₄</b> 3 2 3 3	<b>PO</b> 5	PO <sub>6</sub>	PO <sub>7</sub>	PO <sub>8</sub>		PO <sub>10</sub>	PO <sub>11</sub>	<b>PO</b> <sub>12</sub>
Outcomes           CO1           CO2           CO3           CO4	3	2	2	<b>PO₄</b> 3 2 3 3	<b>PO</b> 5	PO <sub>6</sub>		PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>10</sub>	PO <sub>11</sub>	<b>PO</b> <sub>12</sub>
Outcomes           CO1           CO2           CO3           CO4	3	2 3	2	<b>PO</b> <sub>4</sub> 3 2 3 <b>- Reaso</b>	PO5 3 nable; 2	PO <sub>6</sub>	PO7 ant; 3 – Sti	PO <sub>8</sub>	<b>PO</b> <sub>9</sub>			PO12
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	a a a a a a a a a a a a a a a a a a a	2 3 Introd	2 1 luction	<b>PO</b> <sub>4</sub> 3 2 3 - <b>Reaso</b> to algo:	PO5 3 nable; 2	PO <sub>6</sub>	PO7 ant; 3 - Str	PO <sub>8</sub>	PO <sub>9</sub>	eorem,	Sorting:	1 Quicl
Outcomes           CO1           CO2           CO3           CO4	a a a a a a a a a a a a a a a a a a a	2 3 Introd Sort,	2 1 luction Heap S	<b>PO</b> ₄ 3 2 3 1 - <b>Reaso</b> to algoi ort, Sh	PO₅ 3 nable; 2 rithm, 0 aker So	PO <sub>6</sub> - Signific Growth o ort, and	PO7 ant; 3 – Str	PO <sub>8</sub> rong ons, Mast g Sort. A	PO <sub>9</sub>	eorem,	Sorting:	1 Quicl
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	a a a a a a a a a a a a a a a a a a a	2 3 Introd Sort, recurr	2 1 luction Heap S rence re	PO <sub>4</sub> 3 2 3 <b>- Reaso</b> ort, Sh elations	PO5 3 nable; 2 rithm, ( aker So using s	PO <sub>6</sub> - Signific Growth o ort, and substituti	PO7 ant; 3 – Str of function Counting	PO <sub>8</sub>	PO9 2 ter's The Asympto	eorem,	Sorting: tation; S	1 Quicl Solving
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	a a a a a a a a a a a a a a a a a a a	2 3 Introd Sort, recurr Greed	2 luction Heap S rence re	PO <sub>4</sub> 3 2 3 <b>- Reaso</b> to algor ort, Sh elations nod: Mi	PO₅ 3 nable; 2 rithm, ( aker So using s nimum	PO <sub>6</sub> - Signific Growth o ort, and substituti Spanni	PO7 ant; 3 – Str of functio Counting ion metho ng Tree-	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A	PO9 2 ter's The Asympto	eorem, otic No n, Tarja	Sorting: tation; S an's Alg	1 Quicl Solviną
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	ents:	2 3 Introd Sort, recurr Greed	2 luction Heap S rence re	PO <sub>4</sub> 3 2 3 <b>- Reaso</b> to algor ort, Sh elations nod: Mi	PO₅ 3 nable; 2 rithm, ( aker So using s nimum	PO <sub>6</sub> - Signific Growth o ort, and substituti Spanni	PO7 ant; 3 – Str of function Counting	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A	PO9 2 ter's The Asympto	eorem, otic No n, Tarja	Sorting: tation; S an's Alg	1 Quick Solving
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	ents:	2 3 Introd Sort, recurr Greed Introd	2 luction Heap S rence re y Meth luction	PO₄ 3 2 3 - Reaso ort, Sh elations nod: Mi to Dyn	PO₅ 3 nable; 2 rithm, 0 aker So using s nimum namic	PO <sub>6</sub> - Signific Growth o ort, and substituti Spannin program	PO7 ant; 3 – Str of functio Counting ion metho ng Tree-	PO <sub>8</sub> rong ons, Mast g Sort. <i>A</i> od. Prim's <i>A</i> incipal	PO <sub>9</sub> 2 ter's The Asympto Ilgorithm	eorem, otic No n, Tarja nality,	Sorting: tation; S an's Alg Single S	1 Quick Solving orithm
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	ents:	2 3 Introd Sort, recurr Greed Introd Shorte	2 luction Heap S rence re y Meth luction est Pat	PO₄ 3 2 3 1 - Reaso ort, Sh elations nod: Mi to Dyn h-Belln	PO₅ 3 nable; 2 rithm, C aker So using s nimum namic nan-Foi	PO6 - Signific Growth o ort, and substituti Spannin program rd Algor	PO7 ant; 3 – Str of functio Counting ion metho ing Tree- ming, pr	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal o Il Pairs	PO9 2 ter's The Asympto Igorithi of optin Shorte	eorem, otic No n, Tarja nality, st Patl	Sorting: tation; S an's Alg Single S ns Algo	Quicl Solvinş orithm
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	ents:	2 3 Introd Sort, recurr Greed Introd Shorte Johnse	2 luction Heap S rence re y Meth luction est Pat	PO <sub>4</sub> 3 2 3 to algotor, Sh cort, Sh cort, Sh cort, Sh cort, Mi to Dyn h-Belln orithm,	PO₅ 3 nable; 2 rithm, C aker So using s nimum namic nan-Foi Longes	PO6 - Signific Growth of ort, and substituti Spannin program rd Algon st Comm	PO7 ant; 3 – Str of function Counting fon methor ing Tree- ming, pr rithm, Al	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal ence (LCS	PO9 2 ter's The Asympto Igorithi of optin Shorte S), Huffi	eorem, otic No n, Tarja nality, st Patl nan's co	Sorting: tation; S an's Algo Single S ns Algo ode.	Quicl Solving orithm
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2	ents:	2 3 Introd Sort, recurr Greed Introd Shorte Johnse String Naives	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith	PO <sub>4</sub> 3 2 3 to algotor, Sh cort, Sh cort, Sh cort, Sh cort, Mi to Dyn h-Belln orithm,	PO₅ 3 nable; 2 rithm, ( aker So using s nimum namic nan-Foi Longes roducti	PO <sub>6</sub> - Signific Growth o ort, and substituti Spannin program rd Algon st Comm ion to St	PO7 PO7 ant; 3 – Str of function Counting ion methon ion methon ing Tree- ming, pr rithm, Al ion Seque	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal ll Pairs ence (LCS ching, ap	PO9 2 ter's The Asympto Igorithi of optin Shorte S), Huffi oplicatio	eorem, otic No n, Tarja nality, st Patl nan's co on of st	Sorting: tation; S an's Algo Single S ns Algo ode.	Quice Solving orithm Source rithm tching
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	ents:	2 3 Introd Sort, recurr Greed Introd Shorte Johnso String	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith	PO₄ 3 2 3 <b>- Reaso</b> to algor ort, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int	PO₅ 3 nable; 2 rithm, ( aker So using s nimum namic nan-Foi Longes roducti	PO <sub>6</sub> - Signific Growth o ort, and substituti Spannin program rd Algon st Comm ion to St	PO7 PO7 ant; 3 – Str of function Counting fon methor ng Tree- ming, pr rithm, Al on Seque ring Mato	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal ll Pairs ence (LCS ching, ap	PO9 2 ter's The Asympto Igorithi of optin Shorte S), Huffi oplicatio	eorem, otic No n, Tarja nality, st Patl nan's co on of st	Sorting: tation; S an's Algo Single S ns Algo ode. ring mat	Quice Solving orithm Source rithm tching
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2	ents:	2 3 Introd Sort, recurr Greed Introd Shorte Johnso String Naives Moore	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith e.	PO₄ 3 2 3 1 - Reaso ort, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int m, Rabin ained N	PO₅ 3 nable; 2 rithm, C aker So using s nimum namic nam-For Longes roducti n Karp fatrix M	PO <sub>6</sub> - Signific Growth o ort, and substituti Spannin program rd Algor st Comm ion to St p algor Aultiplica	PO7 PO7 ant; 3 – Str of function Counting fon methor ing Tree- ming, pr rithm, All on Seque ring Mato ithm, Knu tion, Trav	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal o ll Pairs ence (LCS ching, ap ith Mo reling Sal	PO <sub>9</sub> 2 ter's The Asympto Igorithi of optin Shorte S), Huffi oplicatio rris-Pra	eorem, otic No n, Tarja nality, st Patl nan's co on of st tt alg n Proble	Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, 1 em (TSP	Quict Solving orithm Source rithm tching Boyer
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 3	ents:	2 3 Introd Sort, recurr Greed Introd Shorte Johnse String Naives Moore Algorit NP-Ha	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith e. chm. Ch ard an	PO₄ 3 2 3 4 - Reaso ort, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int m, Rabin ained M d NP-	PO₅ 3 nable; 2 rithm, C aker So using s nimum namic nam-Foi Longes roducti n Karj fatrix M -Comple	PO6 - Signific Growth o ort, and substituti Spannin program rd Algon st Comm ion to St p algon <u>Aultiplica</u> ete pro	PO7 PO7 ant; 3 – Str of function Counting fon methon ing Tree- ming, pr rithm, All on Seque ring Mato ithm, Knu tion, Traw blems:	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal o incipal o ll Pairs ence (LCS ching, ap th Mo reling Sal Basic (	PO <sub>9</sub> 2 ter's The Asympto Igorithi of optin Shorte S), Huffi oplicatio rris-Pra lesperso Concepts	eorem, otic Nor n, Tarja nality, st Patl nan's co on of st tt alg <u>n Probl</u> s, Nor	Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, 1 em (TSP i-Detern	Quicl Solving orithm Source rithm tching Boyer
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2	ents:	2 3 Introd Sort, recurr Greed Introd Shorte Johnso String Naive: Moore Algorit NP-Ha Algorit	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith e. thm. Ch and an thms, N	PO₄ 3 2 3 4 - Reaso ort, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int m, Rabin ained M d NP-	PO₅ 3 nable; 2 rithm, C aker So using s nimum namic nam-Foi Longes roducti n Karj fatrix M -Comple	PO6 - Signific Growth o ort, and substituti Spannin program rd Algon st Comm ion to St p algon <u>Aultiplica</u> ete pro	PO7 PO7 ant; 3 – Str of function Counting fon methor ing Tree- ming, pr rithm, All on Seque ring Mato ithm, Knu tion, Trav	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal o incipal o ll Pairs ence (LCS ching, ap th Mo reling Sal Basic (	PO <sub>9</sub> 2 ter's The Asympto Igorithi of optin Shorte S), Huffi oplicatio rris-Pra lesperso Concepts	eorem, otic Nor n, Tarja nality, st Patl nan's co on of st tt alg <u>n Probl</u> s, Nor	Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, 1 em (TSP i-Detern	Quicl Solving orithm Source rithm tching Boyer
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 3	ents:	2 3 Introd Sort, recurr Greed Introd Shorte Johnso String Naive Algorit Algorit Algorit	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith e. thm. Ch ard an thms, N thms	PO₄ 3 2 3 1 - Reaso to algo: ort, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int m, Rabin ained N id NP-Han	PO₅ 3 nable; 2 rithm, ( aker So using s nimum namic han-For Longes roducti n Kar Aatrix M -Comple rd and	PO6 - Signific Growth of ort, and substituti program rd Algon st Comm ion to St p algon Aultiplica ete pro NP-Comm	PO7 PO7 ant; 3 – Str of functio Counting fon metho ng Tree- ming, pr rithm, Al on Seque ring Mato ithm, Knu tion, Trav oblems: mplete C	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal l Pairs ence (LCS ching, ap ith Mo reling Sal Basic C lasses, G	PO9 2 2 ter's The Asympto Asympto Shorte S), Huffi oplicatio rris-Pra lesperso Concept: Cook's	eorem, otic No n, Tarja nality, st Patl nan's co on of st tt alg <u>n Probl</u> s, Nor theorem	Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, I em (TSP -Detern h. Rando	Quicl Quicl Solvinş orithm Source rithm tching Boyer
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 3 Unit: 4	ents:	2 3 3 Introd Sort, recurr Greed Introd Shorte Johnso String Naive Algorit Algorit Algorit Algorit Introd	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith e. chm. Ch and an chms, N chms uction t	PO₄ 3 2 3 1 - Reaso to algoi ort, Sh elations to Dyn h-Belln orithm, ing: Int m, Rabin ained M id NP-Han co paral	PO₅ 3 nable; 2 rithm, ( aker So using s nimum namic nan-For Longes roducti n Karj (atrix M -Comple rd and lel alg	PO6 - Signific Growth o ort, and substituti rogram rd Algon st Comm ion to St p algor <u>Aultiplica</u> ete proc NP-Con gorithm.	PO7 PO7 ant; 3 – Str of functio Counting fon metho ing Tree- ming, pr rithm, Al on Seque ring Mate ithm, Knu tion, Trav oblems: mplete C Parallel	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal of incipal of l Pairs ence (LCS ching, ap th Mo reling Sal Basic C lasses, O Algorith	PO <sub>9</sub> 2 ter's The Asympto Ilgorithm of optin Shorte S), Huffr oplicatio rris-Pra lesperso Concepts Cook's m- Ana	eorem, otic Nor n, Tarja nality, st Patl nan's co on of st tt alg <u>n Probl</u> s, Nor theorem	Sorting: Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, 1 em (TSP a-Detern n. Rando	Quicles orithm Solving tching Boyer ) ninistic omized
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 3	ents:	2 3 Introd Sort, recurr Greed Introd Shorte Johnse String Naive String Naive Algorit NP-Ha Algorit Algorit Introd Rando	2 luction Heap S ence re y Meth luction est Pat on's Alg Match algorith e. chm. Ch ard an chms, N chms uction t m Acce	PO₄ 3 2 3 <b>- Reaso</b> to algor ort, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int m, Rabin ained M d NP-Han co paral ss Mach	PO₅ 3 nable; 2 rithm, C aker So using s nimum namic nan-Foi Longes roducti n Karj fatrix M -Comple rd and llel alg nimes (P	PO <sub>6</sub> - Signific Growth o ort, and substituti program rd Algor st Comm ion to St p algor <u>Aultiplica</u> ete proc NP-Con gorithm. RAM), Pa	PO7 PO7 ant; 3 – Str of functio Counting fon metho ng Tree- ming, pr rithm, Al on Seque ring Mato ithm, Knu tion, Trav oblems: mplete C	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal of incipal of l Pairs ence (LCS ching, ap th Mo reling Sal Basic C lasses, O Algorith	PO <sub>9</sub> 2 ter's The Asympto Ilgorithm of optin Shorte S), Huffr oplicatio rris-Pra lesperso Concepts Cook's m- Ana	eorem, otic Nor n, Tarja nality, st Patl nan's co on of st tt alg <u>n Probl</u> s, Nor theorem	Sorting: Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, 1 em (TSP a-Detern n. Rando	Quick Quick Solving orithm Source rithm tching Boyer ) ninistic
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5	2 eents:	2 3 Introd Sort, recurr Greed Introd Shorte Johnse String Naive String Naive Algorit Algorit Algorit Algorit Algorit Controd Shorte String	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith c. hms. N thms uction t m Acce ting, Se	PO₄ 3 2 3 1 - Reaso ort, Sh elations oot, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int m, Rabin ained M id NP-Han ss Mach arching	PO₅ 3 nable; 2 rithm, C aker So using s nimum namic nan-Foi Longes roducti n Karj fatrix M -Comple rd and llel alg innes (P and Me	PO6 - Signific Growth of ort, and substituti Spannin program rd Algor st Comm ion to St p algor <u>Aultiplica</u> ete proc NP-Con gorithm. RAM), Pa erging.	PO7 ant; 3 – Str of function Counting ion methor ing Tree- ming, pr rithm, All ion Seque ring Mate ithm, Knu tion, Trav oblems: mplete C Parallel rallel Algo	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal of ll Pairs ence (LCS ching, ap ith Mo reling Sal Basic C lasses, O Algorith	PO <sub>9</sub> 2 ter's The Asympto digorithm of optin Shorte S), Huffn oplicatio rris-Pra lesperso Concepts Cook's m- Ana tructure	eorem, otic Nor n, Tarja nality, st Patl nan's co on of st tt alg <u>n Probl</u> s, Nor theorem	Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, I em (TSP i-Detern n. Rando iodels, Pa el Algorit	Quicl Quicl Solving orithm Source rithm tching Boyer ) ninistic omized arallel thms
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination a	ents:	2 3 3 Introd Sort, recurr Greed Introd Shorte Johnse String Naive: Moore Algorit NP-Ha Algorit Introd Rando forSor <b>ation Pa</b>	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith e. thm. Ch ard an thms, N thms uction t m Acce ting, Se ttern: It	PO₄ 3 2 3 1 - Reaso ort, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int m, Rabin ained N id NP-Han ss Mach arching include	PO₅ 3 nable; 2 rithm, C aker So using s nimum hamic han-For Longes roducti h Karp fatrix M -Comple rd and llel alg hines (P and Me both int	PO6 - Signific Growth of ort, and substituti Spannin program rd Algor st Comm ion to St p algor Multiplica ete proc NP-Con gorithm. RAM), Pa erging. ernal eval	PO7 PO7 ant; 3 – Str of function Counting fon methor ing Tree- ming, pr rithm, All ing Seque ring Mate ithm, Knu tion, Trave blems: mplete C Parallel rallel Algo uation (30	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal l Pairs ence (LCS ching, ap ith Mo reling Sal Basic C lasses, C Algorith prithm Si marks) co	PO <sub>9</sub> 2 ter's The Asympto digorithm of optin Shorte S), Huffn oplicatio rris-Pra lesperso Concept: Cook's m- Ana tructure	eorem, otic Nor n, Tarja nality, st Patl nan's co on of st tt alg <u>n Proble</u> s, Nor theorem alysis, m , Paralle	Sorting: Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, I em (TSP I-Detern h. Rando el Algorit ss sessior	Quick Solving orithm Source rithm tching Boyer ) ninistic omizee arallel chms
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination a exams/ assign	ents:	2 3 3 Introd Sort, recurr Greed Introd Shorte Johnse String Naive: Moore Algorit NP-Ha Algorit Introd Rando forSor <b>ation Pa</b>	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith e. thm. Ch ard an thms, N thms uction t m Acce ting, Se ttern: It	PO₄ 3 2 3 1 - Reaso ort, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int m, Rabin ained N id NP-Han ss Mach arching include	PO₅ 3 nable; 2 rithm, C aker So using s nimum hamic han-For Longes roducti h Karp fatrix M -Comple rd and llel alg hines (P and Me both int	PO6 - Signific Growth of ort, and substituti Spannin program rd Algor st Comm ion to St p algor Multiplica ete proc NP-Con gorithm. RAM), Pa erging. ernal eval	PO7 PO7 ant; 3 – Str of function Counting fon methor ing Tree- ming, pr rithm, All ing Seque ring Mate ithm, Knu tion, Trave blems: mplete C Parallel rallel Algo uation (30	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal l Pairs ence (LCS ching, ap ith Mo reling Sal Basic C lasses, C Algorith prithm Si marks) co	PO <sub>9</sub> 2 ter's The Asympto digorithm of optin Shorte S), Huffn oplicatio rris-Pra lesperso Concept: Cook's m- Ana tructure	eorem, otic Nor n, Tarja nality, st Patl nan's co on of st tt alg <u>n Proble</u> s, Nor theorem alysis, m , Paralle	Sorting: Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, I em (TSP I-Detern h. Rando el Algorit ss sessior	Quick Solving orithm Source rithm tching Boyer ) ninistic omizee arallel chms
Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination a	ents:	2 3 3 Introd Sort, recurr Greed Introd Shorte Johnse String Naive: Moore Algorit NP-Ha Algorit Introd Rando forSor <b>ation Pa</b>	2 luction Heap S rence re y Meth luction est Pat on's Alg Match algorith e. thm. Ch ard an thms, N thms uction t m Acce ting, Se ttern: It	PO₄ 3 2 3 1 - Reaso ort, Sh elations nod: Mi to Dyn h-Belln orithm, ing: Int m, Rabin ained N id NP-Han ss Mach arching include	PO₅ 3 nable; 2 rithm, C aker So using s nimum hamic han-For Longes roducti h Karp fatrix M -Comple rd and llel alg hines (P and Me both int	PO6 - Signific Growth of ort, and substituti Spannin program rd Algor st Comm ion to St p algor Multiplica ete proc NP-Con gorithm. RAM), Pa erging. ernal eval	PO7 PO7 ant; 3 – Str of function Counting fon methor ing Tree- ming, pr rithm, All ing Seque ring Mate ithm, Knu tion, Trave blems: mplete C Parallel rallel Algo uation (30	PO <sub>8</sub> rong ons, Mast g Sort. A od. Prim's A incipal l Pairs ence (LCS ching, ap ith Mo reling Sal Basic C lasses, C Algorith prithm Si marks) co	PO <sub>9</sub> 2 ter's The Asympto digorithm of optin Shorte S), Huffn oplicatio rris-Pra lesperso Concept: Cook's m- Ana tructure	eorem, otic Nor n, Tarja nality, st Patl nan's co on of st tt alg <u>n Proble</u> s, Nor theorem alysis, m , Paralle	Sorting: Sorting: tation; S an's Algo Single S ns Algo ode. ring mat orithm, I em (TSP I-Detern h. Rando el Algorit ss sessior	Quick Solving orithm Source rithm tching Boyer ) ninistic omizee arallel chms

2	Design and Analysis of Algorithms, Manas Ranjan Kabat, PHI.
Refe	rence Books:
1	Design and Analysis of Algorithms, R. Panneerselvam, PHI.
2	Parallel Algorithms, Henri Casanova, Arnaud Legrand, Yves Robert, CRC Press.

Course Co	de							ture				
MTCS112P	СТ					elligence			L	Т Р		
Version: 1.2				e of Appr	r <b>oval:</b> 16t	h BoS 17-			4	0 0		
	Scheme	1 1					S	cheme o				
	Periods		Hrs.							n Score	:	100
Period	s/Week	: 4						Inte		aluation	:	30
	Credits	: 4				End Sen					:	70
Instructio			cture						Exam D	uration	:	3 Hrs.
Prerequisite(s):		Mathema	atics									
Course Objectiv			0 1 1 1									
<ol> <li>To understa</li> <li>To learn th uncertain er</li> <li>To develop t</li> <li>To distinction</li> </ol>	inking an wironmer he intellig	d intelli nts. gent mac	gence ir chines us	n ways t	that ena	ble the c	onstructio		nputer	systems	that v	vorks in
Course Outcom												
COs No.				9	Stateme	nt				Мар	ped Pr	ogram
											comes	
CO <sub>1</sub>	Able to	choose	the app	propriate	e repres	entation	for an AI	Probler	n and		PO <sub>1</sub> , P	· /
	construc				1						,	
CO <sub>2</sub>			-		n and im	plementa	tion				PO <sub>2</sub>	
CO <sub>3</sub>						AI Syster					PO <sub>3</sub> , P	<b>O</b> <sub>4</sub>
CO <sub>4</sub>	0					telligence					<b>D</b> <sub>2</sub> , <b>PO</b> <sub>4</sub>	
PO1- Engineering	Knowledge	e, <b>PO</b> 2- Pr	oblem an	alysis, <b>PO</b>	3- Design	/developn	nent of solut	tions, PO4	- Condu			
problems, <b>PO</b> 5- M	odern tool	usage, P	<b>D</b> <sub>6</sub> - The e	ngineer a	nd societ	y, <b>PO</b> 7- En	vironment a	nd sustair	hability, 1			
or team work, <b>PO</b> 1	o- Commu	nication, I										
			Mappi	ng of co	urse out	comes wi	th program	outcom	es			
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	<b>PO</b> <sub>11</sub>	PO
Outcomes	101	102	103	104	105	100	10/	10.	109	1010	101	1012
CO <sub>1</sub>	2	2										
$CO_2$		2										
CO <sub>3</sub>			2	1								
CO <sub>4</sub>		2		1					1			
			1 -	Reasona	ble; 2 – S	Significan	t; 3 – Stron	ıg				
Detailed Conter	nts:											
							Intelligenc					
Unit: 1		Intellig	ence, Ap	plicatio	ns of Art	ificial Inte	elligence, Ir	ntelligent	t Agents	s, Structı	ire of I	ntelliger
		Agents	. Compu	ter visio	n, Natura	al Langua	ge Possessi	ng.				
							solutions,					
Unit: 2		search	strateg	ies, Loca	al searcl	h algorith	ims and o	ptimistic	proble	ems, Adv	versaria	al Search
					a - Beta j							
							g: Proposi					
Unit: 3		Inferer	nce in f	irst ord	er logic	, Resolut	ion, Unific	cation, F	orward	& Bacl	kward	chaining
		Probab	ilistic re	asoning,	Utility t	heory, Hie	dden Mark	ov Model	s (HMM	4), Bayesi	an Net	works.
							nsupervise					
Unit: 4							data - Na	ive Baye	s mode	ls, Learn	ing wit	h hidde
						nent learr						
							esign prin					
Unit: 5							ter estima					
Unit. 5							Analysis (LI				iques	- Neares
							neans clust					
Examination an												
exams/ assignm	ients/ qui	iz/ semi	nar pres	entation	etc. and	external	evaluation	(70 mark	s) whic	h is main	ly end	semeste
examination.												
Text Books:												
1 Russell S.	and Norvi	g P., "Ar	tificial In	telligend	ce – A Me	odern Apr	oroach", Pe	arson Ed	ucation	1		
2 Rich E. an												
Reference Book		,		0 . 7								
		tificial I	ntelligen	ce and F	xpert Sv	stems". P	rentice Hal	l of India	l <b>.</b>			
							proach", Pe			)		
		o., 11	and an and		~ 11111	- acrissipp			acación	-		

MTCS111F	Course CodeCourse TitleLectureMTCS111RMTResearch Methodology and IPRLT											
Version: 1.2	RMT								L T	_	Seme	ster: I
Version: 1.2	Schom	o of Inct	Dat. ruction	e of App	roval: 16	th BoS 17-		Scheme of	4 0	-		
No o	f Periods		Hrs.						Maximum		: 100	
	s/Week	: 4	1115.						ernal Eval		: 30	
	Credits	: 4				End Semester : 70						
Instructio	on Mode	: Le	cture						Exam Dı	uration	: 2 H	rs.
Prerequisite(	<i>′</i>	cific pre	requisite									
Course Objec					<b>a</b>							
							plied for th	ie same				
<ol> <li>To design</li> <li>To prepar</li> </ol>						experimer	its					
		-		-	-	or student	s in genera	al & engin	eering in	narticul	ar	
Course Outco				promot	eu union	ig student	5 III genere	in a cingin	cering in	purticul		
COs No.	(				Staten	nent				Ma	apped Pro	ogram
											utcomes	
CO <sub>1</sub>	Illustra	te the	researd	ch obje	ctives a	and con	struct re	esearch	problen	n P	<b>O</b> 1, <b>PO</b> 2,	PO <sub>9</sub> ,
	scientif			Ũ					-		<b>PO</b> <sub>12</sub>	
CO <sub>2</sub>	Apply t	he svs	tematic	appro	ach to	achieve	researc	h obiect	tives an	d PC	<b>D</b> 4, <b>PO</b> 8,	PO <sub>9</sub>
	analyse	-						j		_		
CO <sub>3</sub>	2			tten re	esearch	naper	s and de	efend ir	n review	V P	O <sub>4</sub> , PO <sub>6</sub> ,	<b>PO</b> <sub>12</sub>
	commit		icii wii		locul ci	i puper	s and a			v	, ,	
CO <sub>4</sub>	Develo		rts and	files							<b>PO</b> <sub>6</sub> , <b>PO</b>	)12
PO1- Engineerii					PO2- Desi	ion /develo	pment of so	lutions <b>PC</b>	A- Conduc	rt investio	-	
problems, PO <sub>5</sub> -												
or team work, <b>I</b>	P <b>O</b> 10- Comn	nunicatio										
		[	Map	ping of	course o	utcomes	with progr	am outco	mes			1
Course Outcomes	PO <sub>1</sub>	$PO_2$	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	<b>PO</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>
CO <sub>1</sub>	1	2				2			3			
	1			2				3	2			
CO <sub>3</sub>				3		2		-	_			3
CO <sub>4</sub>						3						3
			1	– Reaso	nable; 2 ·	– Significo	ant; 3 – Str	rong				
Detailed Cont	tents:			-								
							Meaning c					
Unit:	1						haracterist es and Sc					
			-			-	oblem, Res	-				
							s: Quantit					
Unit: 2	2						ns, Methoo					
							es of Relati					
	2						Distribut					
		Dorom	eter Esti		-		Correlation	n Analysis	, Regressi	on Analy	ysis, Time	e Series
Unit: 3	3					sung.					<b>D</b> 1	
Unit: :	3	and Fo	recasting				h Daners	Effective	Technica	1 Writir	ng Devel	oning
		and Fo Writin	g Report	, Dissert	ation an	d Researc	ch Papers: Proposal				0	
Unit: 3 Unit: 4		and Fo Writin Resear	g Report ch Prop	, Dissert osal, Foi	ation an mat of	d Researc Research	Proposal,	Presenta	ntion and	Assess	nent by	Review
		and Fo Writin Resear commi	g Report ch Prop	, Dissert osal, Foi idelines	ation an mat of	d Researc Research	-	Presenta	ntion and	Assess	nent by	Review
Unit: 4	4	and Fo Writing Resear commi Citatio Intelle	g Report ch Prop ttee, Gu ns and Ir ctual pro	, Dissert osal, Foi idelines idexing. operty ri	ation an rmat of for Wri ghts (IPI	d Research Research iting the R): Patents	Proposal, Report, Re s, Copyrigh	Presenta esearch P hts, Trade	ation and aper, Une	Assess derstand rocess o	nent by ling Refe	Review rences
	4	and Fo Writing Resear commi Citatio Intelle Develo	g Report ch Prop ttee, Gu ns and Ir ctual pro	, Dissert osal, Foi idelines idexing. operty ri	ation an rmat of for Wri ghts (IPI	d Research Research iting the R): Patents	Proposal, Report, Re	Presenta esearch P hts, Trade	ation and aper, Une	Assess derstand rocess o	nent by ling Refe	Review rences
Unit: 4 Unit: 5	4	and Fo Writing Resear Commi Citatio Intelled Develo under	g Report ch Prop ttee, Gu ns and In ctual pro pment, 1 PCT.	, Dissert osal, Foi idelines idexing. operty ri internati	ation an rmat of for Wri ghts (IPI onal coo	d Research Research iting the R): Patents operation	Proposal, Report, Re s, Copyrigh on IPR, Pr	Presenta esearch P hts, Trade rocedure	ation and aper, Une emarks, P for Gran	Assessi derstand rocess of ts of Pa	nent by ling Refe of Patent tents, Pa	Review prences ing and tenting
Unit: 4 Unit: 5 <b>Examination</b>	4 5 and Evalu	and Fo Writin Resear commi Citatio Intelle Develo under	g Report ch Prop ttee, Gu ns and In ctual pro pment, I PCT. <b>Pattern:</b>	, Dissert osal, Foi idelines ndexing. operty ri internati	ation an rmat of for Wri ghts (IPH onal coo	d Research Research iting the R): Patent: operation internal e	Proposal, Report, Re s, Copyrigh on IPR, Pr valuation (	Presenta esearch P hts, Trade rocedure (30 marks	ation and aper, Une emarks, P for Gran	Assessi derstand rocess o ts of Pa sing two	nent by ling Refe of Patent tents, Pa	Review prences ing and tenting
Unit: 4 Unit: 5 <b>Examination</b> exams/ assign	4 5 and Evalu	and Fo Writin Resear commi Citatio Intelle Develo under	g Report ch Prop ttee, Gu ns and In ctual pro pment, I PCT. <b>Pattern:</b>	, Dissert osal, Foi idelines ndexing. operty ri internati	ation an rmat of for Wri ghts (IPH onal coo	d Research Research iting the R): Patent: operation internal e	Proposal, Report, Re s, Copyrigh on IPR, Pr valuation (	Presenta esearch P hts, Trade rocedure (30 marks	ation and aper, Une emarks, P for Gran	Assessi derstand rocess o ts of Pa sing two	nent by ling Refe of Patent tents, Pa	Review prences ing and tenting essiona
Unit: 4 Unit: 5 <b>Examination</b>	4 5 and Evalu	and Fo Writin Resear commi Citatio Intelle Develo under	g Report ch Prop ttee, Gu ns and In ctual pro pment, I PCT. <b>Pattern:</b>	, Dissert osal, Foi idelines ndexing. operty ri internati	ation an rmat of for Wri ghts (IPH onal coo	d Research Research iting the R): Patent: operation internal e	Proposal, Report, Re s, Copyrigh on IPR, Pr valuation (	Presenta esearch P hts, Trade rocedure (30 marks	ation and aper, Une emarks, P for Gran	Assessi derstand rocess o ts of Pa sing two	nent by ling Refe of Patent tents, Pa	Review prences ing and tenting essiona

2	C.R. Kothari and Gaurav Garg, "Research Methodology: Methods and Techniques", 4th ed., New Age,
	International Publishers, 2019
Refe	rence Books:
1	Ranjit Kumar, "Research Methodology: A Step by Step Guide for beginners"4th ed., SAGE Publications, 2014
2	Debora J. Halbert, "Resisting Intellectual Property", Routledge, 2006.

riods : Veek : edits : Mode : Agorithm es: vith progra d the com d the com d the com d the com s (CO): oply the F oply the F oply the r alyze th emonstra anner. g Knowle complex 08- Ethics, earning PO1 P 3	Instruction         60 Hrs.         4         2         Practical         Design         amming skill         applexity of al         ally appropria         implementa         Programming         necessary         e Efficiend         ate       algorith         edge,       PO₂-         problems,       F         PO₂-       Individe         Ma       O₂       PO₃	te of App a and impr gorithms ate data si tions of a ing Prob mathema cy and F thm des Problem Pos- Mode dual or tes	roval: 16 rove the tructure lgorithm Stater lem Sta atical al Proofs o sign ap n analys ern tool am work	s and algo as and data ment atements bstractic of Correct oproache usage, <b>PO</b> <sub>3</sub> - usage, <b>PO</b> <sub>10</sub> - Co	11-2022 ning logic. rithms in p a structure for Algon on to solve ctness in es in a p Design/d <b>D</b> esign/d	Inter- problem so s for differ rithms. e problem Algorith problem evelopme gineer an ion, <b>PO</b> 11-	0 ( of Exami Maximur ernal Eva End Se Exam D olving rent kind ms. ms. ms specif nt of s d societ Project f	n Score aluation emester puration ls of prob Ma Ou P ic P ic P olutions, y, <b>PO</b> 7- E	: : : : : : : : : : : : : : : : : : :	<b>1 Program</b> <b>mes (POs</b> <b>PO</b> <sub>2</sub> , <b>PO</b> <sub>4</sub> 2, <b>PO</b> <sub>4</sub> 3, <b>PO</b> <sub>5</sub> <b>PO</b> <sub>9</sub> , <b>PO</b> <sub>12</sub> 4- Condu
riods : Veek : edits : Mode : Agorithm es: vith progra d the com d the com d the com d the com s (CO): oply the F oply the F oply the r alyze th emonstra anner. g Knowle complex 08- Ethics, earning PO1 P 3	Instruction         60 Hrs.         4         2         Practical         Design         amming skill         applexity of al         ally appropria         implementa         Programming         necessary         e Efficiend         ate       algorith         edge,       PO₂-         problems,       F         PO₂-       Individe         Ma       O₂       PO₃	and impr gorithms ate data si tions of a ing Prob mathema cy and F thm des Problem <b>Poblem</b> <b>Poblem</b> <b>O</b> 5- Mod dual or tea apping of	rove the tructure lgorithm <b>Stater</b> lem Sta atical al Proofs c sign ap n analys ern tool am work	programm s and algo as and data ment atements bstractic of Correct oproache iis, PO <sub>3</sub> - usage, P( c, PO <sub>10</sub> - Co	ning logic. rithms in p a structure of for Algor on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	rithms. e problem Algorith problem evelopme gineer an ion, <b>PO</b> 11-	of Exami Maximur ernal Eva End Se Exam D olving rent kind ns. ms specif nt of s d societ Project n	is of prob	i lems. i lems. i ppped utcom O1, P PO2 PO3	50 50 3 Hrs. 4 Programmes (POs PO <sub>2</sub> , PO <sub>4</sub> 2, PO <sub>4</sub> 3, PO <sub>5</sub> PO <sub>9</sub> , PO <sub>12</sub> 4- Conduction
riods : Veek : edits : Mode : Agorithm es: vith progra d the com d the com d the com d the com s (CO): oply the F oply the F oply the r alyze th emonstra anner. g Knowle complex 08- Ethics, earning PO1 P 3	60 Hrs.42PracticalDesignamming skillplexity of aloly appropriaimplementaProgramminnecessarye Efficiendate algorithedge, $PO_2$ -problems, $F$ $PO_9$ -IndividMatrix $O_2$ $PO_3$	l and impi gorithms ate data si tions of a tions of a ing Prob mathema cy and F thm des Problem <b>P</b> oblem dual or tea apping of	tructure lgorithm Stater lem Sta atical al Proofs c sign ap analys ern tool am work	s and algo and data ment atements bstractic of Correct oproache dis, PO <sub>3</sub> - usage, PO c, PO <sub>10</sub> - Co	ning logic. rithms in p a structure of for Algor on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	rithms. e problem Algorith problem evelopme gineer an ion, <b>PO</b> 11-	Maximur ernal Eva End Se Exam D olving rent kind ms. ms specif nt of s d societ Project n	n Score aluation emester puration ls of prob Ma Ou P ic P ic P olutions, y, <b>PO</b> 7- E	i lems. i lems. i ppped utcom O1, P PO2 PO3	50 50 3 Hrs. 4 Programmes (POs PO <sub>2</sub> , PO <sub>4</sub> 2, PO <sub>4</sub> 3, PO <sub>5</sub> PO <sub>9</sub> , PO <sub>12</sub> 4- Conduction
Week     :       edits     :       didits     :       Algorithm     :       ss:	4         2         Practical         Design         amming skill         applexity of al         oly appropria         implementa         Programmin         necessary         e Efficience         ate       algorit         edge, $PO_2$ -         problems, $F$ $PO_9$ -       Individ         Ma $O_2$ $PO_3$	and impi gorithms ate data si tions of a ing Prob mathema cy and F cy and F thm des Problem Po <sub>5</sub> - Mode dual or tea apping of	tructure lgorithm Stater lem Sta atical al Proofs c sign ap analys ern tool am work	s and algo and data ment atements bstractic of Correct oproache dis, PO <sub>3</sub> - usage, PO c, PO <sub>10</sub> - Co	rithms in p a structure for Algor on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	Inter- problem so s for differ rithms. e problem Algorith problem evelopme gineer an ion, <b>PO</b> 11-	ernal Eva End Se Exam D olving rent kind ms. ms specif nt of s d societ Project	iluation emester vuration ls of prob Ma Ou P ic P ic P olutions, y, PO7- E	i lems. i lems. i ppped utcom O1, P PO2 PO3	50 50 3 Hrs. 4 Programmes (POs PO <sub>2</sub> , PO <sub>4</sub> 2, PO <sub>4</sub> 3, PO <sub>5</sub> PO <sub>9</sub> , PO <sub>12</sub> 4- Conduction
edits     :       Mode     :       Algorithm     :       sigorithm     :       oply the r     :	2         Practical         Design         amming skill         aplexity of al         oly appropria         implementa         Programming         necessary         e Efficient         ate       algorit         edge,       PO2-         problems,       F         PO3-       Individ	and impi gorithms ate data si tions of a ing Prob mathema cy and F cy and F thm des Problem Po <sub>5</sub> - Mode dual or tea apping of	tructure lgorithm Stater lem Sta atical al Proofs c sign ap analys ern tool am work	s and algo and data ment atements bstractic of Correct oproache dis, PO <sub>3</sub> - usage, PO c, PO <sub>10</sub> - Co	rithms in p a structure for Algor on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	roblem so s for differ rithms. e probler Algorith problem evelopme gineer an ion, <b>PO</b> 11-	End Se Exam D olving rent kind ns. ms specif nt of s d societ Project	ic Portions, y, PO7- E	i lems. i l	50 3 Hrs. 4 Program nes (POs PO <sub>2</sub> , PO <sub>4</sub> 2, PO <sub>4</sub> 3, PO <sub>5</sub> PO <sub>9</sub> , PO <sub>12</sub> 4- Condu
Mode:IdgorithmIdgorithmIdgorithmis:vith progradingid the completeid the completes (CO):pply the freepply the restpply the restpoly	Practical Design amming skill aplexity of al oly appropria implementa Programmi necessary = e Efficience ate algorit edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Indivice Ma <b>O</b> <sub>2</sub> <b>PO</b> <sub>3</sub>	and impi gorithms ate data si tions of a ing Prob mathema cy and F cy and F thm des Problem Po <sub>5</sub> - Mode dual or tea apping of	tructure lgorithm Stater lem Sta atical al Proofs c sign ap analys ern tool am work	s and algo and data ment atements bstractic of Correct oproache dis, PO <sub>3</sub> - usage, PO c, PO <sub>10</sub> - Co	rithms in p a structure for Algor on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	rithms. e problen Algorith problem evelopme gineer an ion, <b>PO</b> 11-	Exam D olving rent kind ms. ms specif nt of s d societ Project	is of prob Ma Or P ic P olutions, y, PO7- E	ilems. ppped utcorr O1, P PO3 PO3 PO4, P	3 Hrs. 1 Programes (POs PO2, PO4 2, PO4 3, PO5 PO9, PO12 4- Conduction
Algorithm s: /ith progra d the com completed analyze s (CO): pply the F pply the F pply the r anner. g Knowle complex b <sub>8</sub> - Ethics, earning PO <sub>1</sub> P 3	Design Design amming skill plexity of al oly appropria implementa Programmi necessary = e Efficiend ate algorit edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Individ Ma <b>O</b> <sub>2</sub> <b>PO</b> <sub>3</sub>	and impi gorithms ate data si tions of a ing Prob mathema cy and F cy and F thm des Problem Po <sub>5</sub> - Mode dual or tea apping of	tructure lgorithm Stater lem Sta atical al Proofs c sign ap analys ern tool am work	s and algo and data ment atements bstractic of Correct oproache dis, PO <sub>3</sub> - usage, PO c, PO <sub>10</sub> - Co	rithms in p a structure for Algor on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	rithms. e problen Algorith problem evelopme gineer an ion, <b>PO</b> 11-	ns. ms specif nt of s d societ Project	is of prob	lems. ppped utcon O <sub>1</sub> , P PO <sub>2</sub> PO <sub>3</sub> PO <sub>4</sub> , P PO <sub>4</sub>	- d Program nes (POs PO2, PO4 2, PO4 2, PO4 3, PO5 PO9, PO12 4- Condu onment a
s: ith progra id the com ills to app d analyze s (CO): pply the F pply the r pply the r alyze th emonstra anner. g Knowle complex s-Ethics, earning PO <sub>1</sub> P 3	amming skill applexity of al oly appropria implementa Programmi necessary r e Efficiend ate algorit edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Individ Ma <b>O</b> 2 <b>PO</b> 3	gorithms ate data si tions of a ing Prob mathema cy and F thm des Problem <b>Po</b> 5- Mod dual or tea apping of	tructure lgorithm Stater lem Sta atical al Proofs c sign ap analys ern tool am work	s and algo and data ment atements bstractic of Correct oproache dis, PO <sub>3</sub> - usage, PO c, PO <sub>10</sub> - Co	rithms in p a structure for Algor on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	rithms. e problen Algorith problem evelopme gineer an ion, <b>PO</b> 11-	ms. ms specif nt of s d societ Project	Ma       On       P       ic       P       olutions,       y, PO7- E	PO2 PO3 PO4, P	<b>1 Program</b> <b>mes (POs</b> <b>PO</b> <sub>2</sub> , <b>PO</b> <sub>4</sub> 2, <b>PO</b> <sub>4</sub> 3, <b>PO</b> <sub>5</sub> <b>PO</b> <sub>9</sub> , <b>PO</b> <sub>12</sub> 4- Condu
vith progra d the com sills to app d analyze s (CO): pply the F pply the r pply the r alyze th emonstration g Knowle complex ps- Ethics, earning PO <sub>1</sub> P 3	pplexity of al ply appropria implementa Programmi necessary = e Efficience ate algorit edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Indivice Ma <b>O</b> <sub>2</sub> <b>PO</b> <sub>3</sub>	gorithms ate data si tions of a ing Prob mathema cy and F thm des Problem <b>Po</b> 5- Mod dual or tea apping of	tructure lgorithm Stater lem Sta atical al Proofs c sign ap analys ern tool am work	s and algo and data ment atements bstractic of Correct oproache dis, PO <sub>3</sub> - usage, PO c, PO <sub>10</sub> - Co	rithms in p a structure for Algor on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	s for differ rithms. e probler Algorith problem evelopme gineer an ion, <b>PO</b> 11-	ms. ms specif nt of s d societ Project	Ma       On       P       ic       P       olutions,       y, PO7- E	PO2 PO3 PO4, P	<b>1 Program</b> <b>mes (POs</b> <b>PO</b> <sub>2</sub> , <b>PO</b> <sub>4</sub> 2, <b>PO</b> <sub>4</sub> 3, <b>PO</b> <sub>5</sub> <b>PO</b> <sub>9</sub> , <b>PO</b> <sub>12</sub> 4- Condu
pply the F pply the r aalyze th emonstra anner. g Knowle complex 08- Ethics, earning PO1 P 3	e Efficiend ate algorit edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Individ Ma <b>O</b> <sub>2</sub> <b>PO</b> <sub>3</sub>	mathema cy and F thm des Problem <b>Po</b> 5- Mode dual or tea apping of	lem Sta atical al Proofs c sign ap n analys ern tool am work course c	bstractic of Corrector oproache sis, <b>PO</b> <sub>3</sub> - usage, <b>PO</b> c, <b>PO</b> <sub>10</sub> - Co outcomes	on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	e problen Algorith problem evelopme gineer an ion, <b>PO</b> 11-	ms specif nt of s d societ Project	Out       P       ic       P       olutions,       y, PO7- E	$\frac{\text{utcon}}{\text{O}_1, \text{ P}}$ $\frac{\text{PO}_2}{\text{PO}_3}$ $\frac{\text{O}_4, \text{P}}{\text{PO}_4}$	mes (POs PO2, PO4 2, PO4 3, PO5 PO9, PO12 4- Condu
ply the r alyze th emonstra anner. g Knowle complex be- Ethics, earning PO1 P 3	e Efficiend ate algorit edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Individ Ma <b>O</b> <sub>2</sub> <b>PO</b> <sub>3</sub>	mathema cy and F thm des Problem <b>Po</b> 5- Mode dual or tea apping of	lem Sta atical al Proofs c sign ap n analys ern tool am work course c	bstractic of Corrector oproache sis, <b>PO</b> <sub>3</sub> - usage, <b>PO</b> c, <b>PO</b> <sub>10</sub> - Co outcomes	on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	e problen Algorith problem evelopme gineer an ion, <b>PO</b> 11-	ms specif nt of s d societ Project	Out       P       ic       P       olutions,       y, PO7- E	$\frac{\text{utcon}}{\text{O}_1, \text{ P}}$ $\frac{\text{PO}_2}{\text{PO}_3}$ $\frac{\text{O}_4, \text{P}}{\text{PO}_4}$	mes (POs PO2, PO4 2, PO4 3, PO5 PO9, PO12 4- Condu
ply the r alyze th emonstra anner. g Knowle complex be- Ethics, earning PO1 P 3	e Efficiend ate algorit edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Individ Ma <b>O</b> <sub>2</sub> <b>PO</b> <sub>3</sub>	mathema cy and F thm des Problem <b>Po</b> 5- Mode dual or tea apping of	atical al Proofs o sign ap n analys ern tool am work course o	bstractic of Correc oproache usage, <b>PO</b> 3- usage, <b>PO</b> c, <b>PO</b> 10- Co outcomes	on to solve ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	e problen Algorith problem evelopme gineer an ion, <b>PO</b> 11-	ms specif nt of s d societ Project	ic Peological Peologic	<b>PO</b> <sub>2</sub> <b>PO</b> <sub>3</sub> <b>O</b> <sub>4</sub> , <b>P</b> <b>PO</b> <sub>4</sub>	2, <b>PO</b> 4 3, <b>PO</b> 5 <b>PO</b> 9, <b>PO</b> 12 4- Condu
alyze th emonstra anner. g Knowle complex 08- Ethics, earning PO1 P 3	e Efficiend ate algorit edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Individ Ma <b>O</b> <sub>2</sub> <b>PO</b> <sub>3</sub>	cy and F thm des Problem <b>PO</b> 5- Mode dual or tes apping of	Proofs c sign ap n analys ern tool am work course c	of Correct oproache usage, <b>PO</b> 3- usage, <b>PO</b> c, <b>PO</b> 10- Co outcomes	ctness in es in a p Design/d D <sub>6</sub> - The en ommunicat	Algorith problem evelopme gineer an ion, <b>PO</b> 11-	ms specif nt of s d societ Project	olutions, y, <b>PO</b> 7- E	PO3 O4, P PO4	3, PO5 PO9, PO12 4- Condu
emonstra anner. g Knowle complex 08- Ethics, earning PO1 P 3	ate algorit edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Individ Ma <b>PO</b> <sub>2</sub> <b>PO</b> <sub>3</sub>	thm des Problem Po5- Mode dual or tea apping of	sign ap n analys ern tool am work course c	pproache sis, <b>PO</b> <sub>3</sub> - usage, <b>PO</b> t, <b>PO</b> <sub>10</sub> - Co putcomes	es in a j Design/d D <sub>6</sub> - The en ommunicat	problem evelopme gineer an ion, <b>PO</b> 11-	specif nt of s d societ Project	olutions, y, <b>PO</b> 7- E	O4, P PO4	<b>PO</b> 9, <b>PO</b> 12 4- Condu
anner. g Knowle complex %- Ethics, earning PO1 P 3	edge, <b>PO</b> <sub>2</sub> - problems, <b>F</b> <b>PO</b> <sub>9</sub> - Individ Ma <b>O</b> <sub>2</sub> <b>PO</b> <sub>3</sub>	Problem PO5- Mode dual or tes apping of	an analys ern tool am work	sis, <b>PO</b> <sub>3</sub> - usage, <b>PO</b> t, <b>PO</b> <sub>10</sub> - Co	Design/d D <sub>6</sub> - The en ommunicat	evelopme gineer an ion, <b>PO</b> 11-	nt of s d societ Project	olutions, y, <b>PO</b> 7- E	PO <sub>4</sub>	- Condu
g Knowle complex 98- Ethics, earning PO1 P 3	Problems, F PO9- Individ Ma O2 PO3	<b>PO</b> ₅- Mode dual or tea apping of	ern tool am work	usage, <b>PG</b> c, <b>PO</b> 10- Co putcomes	<b>D</b> <sub>6</sub> - The en ommunicat	gineer an ion, <b>PO</b> 11-	d societ Project	у, <b>РО</b> 7- Е	nvirc	onment a
	<u> </u>			106	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	РС	D <sub>11</sub> PC
	2	3								
	3	2								
	2		3							
		3					2			1
		1 – Reaso	onable; 2	– Signific	ant; 3 – Sti	rong				
ts:	<u> </u>	1 .		2 1 1 0	1 1	1		•		
us n on g ber gener g with its e Program Heap Sort Shaker So Counting e program Prim's Alg Tarjan's A	graph sheet. rator. Demo time comple n to impleme t sort Sort n to impleme gorithm lgorithm	The eler onstrate u exity analy ent the for ent the Mi	nents ca using C/ ysis: wor llowing S inimum S	an be read C++/Java rst case, a Sorting Alg Spanning	d from a f /Python h verage case gorithms: Tree:	ile or can ow the di	be gene vide and	erated us	sing t	the rando
program to program lement the Naive algo Rabin Kar Knuth Mo	o implement to implem e following F prithm p algorithm prris-Pratt a	t the TSP ent the Pattern M Igorithm	problem Longest	n. 2 Common	n Sequenc	e (LCS) j	problem	. Write 1	the F	Program
	ven set c ram for v is n on g per gener g with its Program Heap Sort Shaker So Counting Program Prim's Alg Carjan's A rogram to rogram to program to rogram to Rabin Kar Knuth Mc Boyer-Mc	ven set of n integer ram for varied values is n on graph sheet. Der generator. Demo g with its time complete Program to impleme Heap Sort Shaker Sort Counting Sort Program to impleme Prim's Algorithm Tarjan's Algorithm Togram to implement rogram to implement program to implement program to implement Rabin Karp algorithm Knuth Morris-Pratt a Boyer-Moore Algorith	ven set of n integer elements ram for varied values of n > 5 is n on graph sheet. The elem- per generator. Demonstrate u g with its time complexity anal Program to implement the fo- leap Sort Shaker Sort Counting Sort program to implement the M Prim's Algorithm Tarjan's Algorithm Togram to implement the Bellin rogram to implement the Bellin rogram to implement the Bellin rogram to implement the Bellin Rajan's Algorithm Rabin Karp algorithm Knuth Morris-Pratt algorithm Boyer-Moore Algorithm	ven set of n integer elements using G ram for varied values of n > 5000 and is n on graph sheet. The elements ca- ber generator. Demonstrate using C/ g with its time complexity analysis: wor Program to implement the following S Heap Sort Shaker Sort Counting Sort Program to implement the Minimum Prim's Algorithm Tarjan's Algorithm Torgram to implement the Bellman-For rogram to implement the Bellman-For rogram to implement the Longest ement the following Pattern Matching Naive algorithm Rabin Karp algorithm Knuth Morris-Pratt algorithm Boyer-Moore Algorithm	ven set of n integer elements using Quick Sor ram for varied values of n > 5000 and record t is n on graph sheet. The elements can be reac per generator. Demonstrate using C/C++/Java, g with its time complexity analysis: worst case, ar Program to implement the following Sorting Alg Heap Sort Shaker Sort Counting Sort program to implement the Minimum Spanning Prim's Algorithm Tarjan's Algorithm Togram to implement the Bellman-Ford Algorith rogram to implement the Longest Common ement the following Pattern Matching Algorithm Naive algorithm Rabin Karp algorithm Knuth Morris-Pratt algorithm Boyer-Moore Algorithm	ven set of n integer elements using Quick Sort method a ram for varied values of n > 5000 and record the time tal is n on graph sheet. The elements can be read from a fi- ber generator. Demonstrate using C/C++/Java/Python h- g with its time complexity analysis: worst case, average case Program to implement the following Sorting Algorithms: Heap Sort Counting Sort Program to implement the Minimum Spanning Tree: Prim's Algorithm Tarjan's Algorithm rogram to implement the Bellman-Ford Algorithm rogram to implement the TSP problem. program to implement the Longest Common Sequence ement the following Pattern Matching Algorithms: Naive algorithm Cabin Karp algorithm Knuth Morris-Pratt algorithm Boyer-Moore Algorithm	ven set of n integer elements using Quick Sort method and comp ram for varied values of n > 5000 and record the time taken to sor is n on graph sheet. The elements can be read from a file or can ber generator. Demonstrate using C/C++/Java/Python how the di g with its time complexity analysis: worst case, average case and best Program to implement the following Sorting Algorithms: Heap Sort Counting Sort Program to implement the Minimum Spanning Tree: Prim's Algorithm Carjan's Algorithm rogram to implement the Bellman-Ford Algorithm rogram to implement the TSP problem. program to implement the Longest Common Sequence (LCS) p ement the following Pattern Matching Algorithms: Naive algorithm Cabin Karp algorithm Knuth Morris-Pratt algorithm Boyer-Moore Algorithm	ven set of n integer elements using Quick Sort method and compute its t ram for varied values of n > 5000 and record the time taken to sort. Plot a is n on graph sheet. The elements can be read from a file or can be gene per generator. Demonstrate using C/C++/Java/Python how the divide and g with its time complexity analysis: worst case, average case and best case. Program to implement the following Sorting Algorithms: Heap Sort Shaker Sort Counting Sort program to implement the Minimum Spanning Tree: Prim's Algorithm Farjan's Algorithm rogram to implement the Bellman-Ford Algorithm rogram to implement the TSP problem. program to implement the Longest Common Sequence (LCS) problem. ement the following Pattern Matching Algorithms: Naive algorithm Rabin Karp algorithm Knuth Morris-Pratt algorithm Boyer-Moore Algorithm	ven set of n integer elements using Quick Sort method and compute its time com ram for varied values of n > 5000 and record the time taken to sort. Plot a graph of its n on graph sheet. The elements can be read from a file or can be generated us ber generator. Demonstrate using C/C++/Java/Python how the divide and-conque gwith its time complexity analysis: worst case, average case and best case. Program to implement the following Sorting Algorithms: Heap Sort Shaker Sort Counting Sort program to implement the Minimum Spanning Tree: Prim's Algorithm Carjan's Algorithm rogram to implement the Bellman-Ford Algorithm rogram to implement the TSP problem. program to implement the Longest Common Sequence (LCS) problem. Write the ement the following Pattern Matching Algorithms: Naive algorithm Rabin Karp algorithm Knuth Morris-Pratt algorithm Boyer-Moore Algorithm	ven set of n integer elements using Quick Sort method and compute its time complexi ram for varied values of n > 5000 and record the time taken to sort. Plot a graph of the is n on graph sheet. The elements can be read from a file or can be generated using t ber generator. Demonstrate using C/C++/Java/Python how the divide and-conquer me g with its time complexity analysis: worst case, average case and best case. Program to implement the following Sorting Algorithms: Heap Sort Shaker Sort Counting Sort program to implement the Minimum Spanning Tree: Prim's Algorithm Carjan's Algorithm rogram to implement the Bellman-Ford Algorithm rogram to implement the TSP problem. program to implement the Longest Common Sequence (LCS) problem. Write the H ement the following Pattern Matching Algorithms: Naive algorithm Rabin Karp algorithm Knuth Morris-Pratt algorithm

exan	nination.
Text	Books:
1	The Algorithm Design Manual by Steve S. Skiena, Springer.
2	https://ds1-iiith.vlabs.ac.in/data-structures-1/ https://ds2-iiith.vlabs.ac.in/data-structures-
	2/
Refe	rence Books:
1	Algorithms: Design and Analysis, Harsh Bhasin, Oxford Publication.
2	The Design and Analysis of Algorithms, Annay Levitin, Pearson.

	de	Course Title								cture		
MTCS211P	CT			Mae	chine Le	earning			L	T P	Se	mester: II
Version: 1.2				of Appr	<b>·oval:</b> 16t	h BoS 17-1	11-2022		4	0 0		
	Scheme		uction				S	cheme o	of Exam	ination		
	Periods	: 60	Hrs.					N	laximu	m Score	:	100
Period	s/Week	: 4						Inte	rnal Ev	aluation	:	30
	Credits	: 4							End Se	emester	:	70
Instructi	on Mode	: Lecture Exam Dura							Duration	:	3 Hrs.	
Prerequisite(s):	Knowled	ge of ba	sic data	science	e algorit	hms						
<b>Course Objectiv</b>	es:											
1. To learn abo	ut the pu	rpose of	Machine	Learnin	ig and wl	here it ap	plies to the	e real wor	rlds.			
2. To understa								ngths an	d weak	nesses.		
3. To learn met	hodology	and too	ls to app	ly machi	ine learn	ing algori	thms.					
4. To real data	and evalu	ate their	perform	ance.								
Course Outcom	es (CO):											
COs No.					Stateme	ent				Ma	apped	Program
CO1         Understand the importance of data pre-processing before machine learning									0	utcon	nes (POs)	
CO <sub>1</sub>	Understa	and the i	mportan	ce of dat	ta pre-pr	rocessing	before ma	chine lea	rning	P	<b>O</b> 1, <b>P</b>	<b>O</b> 2, <b>PO</b> 5
	modeling											
CO <sub>2</sub>	v		te mach	ine learr	ning tech	iniques to	respective	e		P	O2, P	<b>O</b> <sub>4</sub> , <b>PO</b> <sub>5</sub>
	problems.											
CO <sub>3</sub>					0 0				า.			, <b>PO</b> 5
CO <sub>4</sub>			arning al	gorithm	s to solv	e problen	ns of variou	IS		P	<b>O</b> 1, <b>P</b>	<b>O</b> <sub>2</sub> , <b>PO</b> <sub>3</sub>
	complexi											
PO <sub>1</sub> - Engineering												
problems, <b>PO</b> <sub>5</sub> - M										PO <sub>8</sub> - Ethi	cs, <b>PO</b>	9- Individual
or team work, PO1	- Commur	nication, <b>F</b>										
			Mappi	ng of coi	urse outo	comes wit	th program	outcom	es	1		
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>2</sub>	PO₄	PO₅	POs	PO <sub>7</sub>	PO	PO	PO <sub>10</sub>	PO	11 PO12
Course Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>10</sub>	РО	11 <b>PO</b> 12
Outcomes CO <sub>1</sub>	<b>PO</b> <sub>1</sub>	3	PO <sub>3</sub>	PO <sub>4</sub>	2	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>10</sub>	РО	P11 PO <sub>12</sub>
Outcomes			PO <sub>3</sub>	<b>PO</b> <sub>4</sub>		PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>10</sub>	PO	PO12
Outcomes CO <sub>1</sub>		3 3	PO <sub>3</sub>		2	PO <sub>6</sub>	PO <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>10</sub>	PO	PO12
Outcomes           CO1           CO2	2	3	PO <sub>3</sub>		2 3	PO <sub>6</sub>	PO <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>10</sub>	PO	PO <sub>12</sub>
Outcomes           CO1           CO2           CO3	2 3	3 3		2	2 3 3		PO <sub>7</sub>		PO <sub>9</sub>	PO <sub>10</sub>	PO	PO <sub>12</sub>
Outcomes           CO1           CO2           CO3	2 3 2	3 3		2	2 3 3				PO <sub>9</sub>	PO <sub>10</sub>	PO	PO <sub>12</sub>
Outcomes           CO1           CO2           CO3           CO4	2 3 2	3 3 2	1-1	2 3 Reasona	2 3 3 ble; 2 - S	ignifican	t; 3 – Stron	9				
Outcomes           CO1           CO2           CO3           CO4	2 3 2	3 3 2 Introdu	1 – 1	2 3 Reasona	2 3 3 ble; 2 - S	ignificant	t; <b>3 – Stron</b>	g ning syst	cems, C	Goals and	l appl	ications of
Outcomes           CO1           CO2           CO3           CO4	2 3 2	3 3 2 Introdu machin	<b>1</b> -	2 3 Reasona 9 Machir ng in diff	2 3 3 ble; 2 – S ne Learn ferent fie	<b>ignifican</b> ing - Def	t; <b>3 – Stron</b> fining learn as health c	<b>g</b> ning syst	ems, C king, te	Goals and	l appl	ications of
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	2 3 2	3 3 2 Introdu machir market	<b>1</b> – 2 Iction to the learning and	2 3 Reasona 9 Machir ng in difi so on. 4	2 3 <b>ble; 2 – S</b> ble Learn ferent fie Aspects	ing - Defelds such of develo	t; <b>3 – Stron</b> fining learr as health c ping a lear	g ning syst eare, bank rning syst	tems, C king, te	Goals and elecomm	l appl unicat	ications of icon, digital sting data,
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	2 3 2	3 3 2 Introdu machir market concep	<b>1</b> -1 iction to be learnin ing and ot repres	2 <b>Reasona</b> Machir ng in diff so on. A entation	2 3 ble; 2 – S ble; 2 – S	ignificant ing - Def elds such of develo on approx	t; <b>3 – Stron</b> fining learr as health c ping a lear	<b>g</b> ning syst care, ban rning sys general	tems, C king, te stem: tr	Goals and elecomm raining a iew of su	l appl unicat nd te	ications of icon, digital
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	2 3 2	3 3 2 Introdu machir market concep supervi	<b>1</b> – 1 netion to ne learnin ing and ot repres ised, uns	2 <b>Reasona</b> Machir ng in diff so on. <i>A</i> entation upervise	2 3 ble; 2 – S he Learn ferent fic Aspects o h, function ed learnin	iignificant ing - Def elds such of develo on approy ng algorit	t; <b>3 – Stron</b> fining learr as health c ping a lear kimation, a hms and th	<b>g</b> ning syst care, bank ming syst general ne usage	tems, C king, te stem: ti overvi of each	Goals and elecomme raining a iew of su	l appl unicat nd te ipervi m.	ications of tion, digital sting data, sed, semi-
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	2 3 2	3 3 2 Introdu machir market concep superv Basics	<b>1</b> – 1 nction to be learnin ing and ot repres ised, uns of Pytho	2 Reasona Machir ng in diff so on. A entation upervise n: Introo	2 3 ble; 2 – S ble; 2 – S he Learn ferent fie Aspects of a, function ed learnin duction t	ing - Def elds such of develo on appros ng algorit to Python	t; <b>3 – Stron</b> fining learr as health c ping a lear kimation, a hms and th , Control s	g ning syst are, bank ming syst general te usage	tems, C king, te stem: tr overvi of each and fu	Goals and elecomme raining a iew of su algorith unction: i	l appl unicat nd te 1pervi m. f-elif-	ications of tion, digital sting data, sed, semi-
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	2 3 2	3 3 2 Introdu machir market concep supervi Basics loop, fo	1 – 1 nction to be learnin ing and ot repress ised, uns of Pytho or loop,	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break ar	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S cellearning duction to cellearning duction to contin	ing - Def elds such of develo on approx ng algorit to Python nue, Intro	t; <b>3 – Stron</b> fining learr as health c ping a lear kimation, a hms and th , Control s	g ning syst are, bank rning syst general ae usage structure o functio	tems, C king, te stem: tr overvi of each and fu n, Type	Goals and elecommunication of su algorith unction: i es of fun	l appl unicat nd te 1pervi m. f-elif-	ications of ion, digital sting data, sed, semi- else, while
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	2 3 2	3 3 2 Introdu machin market concep supervi Basics loop, fo argume	<b>1</b> – 1 action to be learnin ing and ot repress ised, uns of Pytho pr loop, ents, Lan	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break ar ibda fun	2 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S cellearning duction to ble; 2 – S ble; 2 – S cellearning duction to ble; 2 – S cellearning duction to cellearning duction to contin ctions, F	ing - Def elds such of develo on approx ng algorit to Python nue, Intro ile Handli	fining learn as health c ping a learn kimation, a hms and th t, Control s oduction to ing, packag	g ning syst are, bank rning syst general e usage structure o functio ges and m	tems, C king, te stem: tr overvi of each and fu n, Type nodules	Goals and elecommunity raining a iew of su algorith unction: i es of fun s.	l appl unicat nd te 1pervi m. f-elif- ctions	ications of cion, digital sting data, sed, semi- else, while s, Function
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1	2 3 2	3 3 2 Introdu machin market concep supervi Basics loop, fe argume Python	<b>1</b> – 1 nction to ne learnin ing and ot repress ised, uns of Pytho or loop, ents, Lan Data St	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break ar bda fun ructures	2 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S cel learning ferent fie Aspects of the Learning ferent fie the Learning ferent field ferent f	ing - Def elds such of develo on approv ng algorit to Python nue, Intro 'ile Handli Tuples, D	fining learn as health c ping a learn kimation, a hms and th c, Control s oduction to ing, packag ictionary, S	g ning syst care, bank rning syst a general ne usage structure o functio ges and m Sets, stri	ems, C king, te stem: tr overvi of each and fu n, Type nodules ngs, N	Goals and elecomme raining a iew of su algorith unction: i es of fun s. umPy: Na	l appl unicat nd te ipervi m. f-elif- ctions	ications of icon, digital sting data, sed, semi- else, while s, Function operation,
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1	2 3 2	3 3 2 Introdu machin market concep superv Basics loop, fo argume Python Array	<b>1</b> – 1 action to be learnin ing and ot repress ised, uns of Pytho or loop, ents, Lan Data St and its	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break ar bda fun ructures operatio	2 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S continue ferent fie Aspects of the Learnin ferent fie the Learnin ferent fie the Learnin function the the Learnin function the the Learnin duction the the Learnin function the the the Learnin function the	<b>Eignificant</b> ing - Defelds such of develo on approving algorit to Python nue, Intro "ile Handli Tuples, D ix and as	fining learn as health c ping a learn kimation, a hms and th control s oduction to ing, packag ictionary, s ssociated	g ning syst care, bank ming syst a general ne usage offunctio ges and m Sets, stri operation	tems, C king, te stem: tr overvi of each and fu n, Type nodules ngs, Ni ns, Lin	Goals and elecomme raining a iew of su algorith unction: i es of fun s. umPy: Ne ear alge	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a	ications of ion, digital sting data, sed, semi- else, while s, Function operation, nd related
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1	2 3 2	3 3 2 Introdu machir market concep superv Basics loop, fo argume Python Array a operati	<b>1</b> – action to the learning ing and of repress ised, uns of Pytho or loop, ents, Lan Data St and its ons usi	2 Reasona Machirng in diff so on. A entation upervise n: Introo break an bda fun ructures operation ng pyth	2 3 ble; 2 – S ble; 3	<b>Eignificant</b> ing - Defelds such of develo on approx ng algorit to Python nue, Intro "ile Handli Tuples, D ix and as derstand	fining learn as health o ping a lear kimation, a hms and th control s oduction to ing, packag ictionary, s ssociated o the adva	g ning syst care, bank ming syst general de usage tructure o functio ges and m Sets, stri operation antage	tems, C king, te stem: tr overvi of each and fu n, Type nodules ngs, Ni ns, Lin	Goals and elecomme raining a iew of su algorith unction: i es of fun s. umPy: Ne ear alge	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a	ications of ion, digital sting data, sed, semi- else, while s, Function operation, nd related
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1	2 3 2	3 3 2 Introdu machin market concep superv Basics loop, fo argume Python Array a operati implem	<b>1</b> – <b>1</b> –	2 Reasona Machir ng in diff so on. <i>A</i> entation upervise n: Introo break an bda fun ructures operatio ng pyth Aachine	2 3 ble; 2 – S ble; 3	ing - Def elds such of develo on appros ng algorit to Python nue, Intro 'ile Handli Tuples, D ix and as derstand g models.	fining learn as health o ping a lear kimation, a hms and th control s oduction to ing, packag ictionary, s ssociated o the adva Types of d	g ning syst care, bank ming syst general e usage structure o functio ges and m Sets, stri operation intage c ata sets.	ems, C king, te stem: tr overvi of each and fu n, Type nodules ngs, N ns, Lin of usin	Goals and Elecommunity raining a iew of su algorith unction: i es of fun s. umPy: Nu ear alge ng Pytho	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a pn lit	ications of ications of cion, digital sting data, sed, semi- else, while s, Function operation, nd related praries for
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1	2 3 2	3 3 2 Introdu machir market concep superv Basics loop, fo argume Python Array operati implem Pandas	1 – action to a learnin ing and ot repres ised, uns of Pytho or loop, ents, Lan Data St and its ions usi <u>benting M</u> data fra	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break ar bda fun ructures operatio ng pyth <u>Aachine</u> me and	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S constant ferent fie Aspects of a function ded learnin duction to a function duction to a contin actions, F s: Lists, 7 on, Matr non. Un Learning data fram	ing - Def elds such of develo on appros ng algorit to Python nue, Intro ïle Handli Tuples, D ix and as derstand g models. me relate	fining learn as health or ping a learn kimation, a hms and th control so oduction to ing, packag ictionary, S ssociated of the adva Types of da d operation	g ning syst are, bank ming syst general e usage structure o function ges and m Sets, stri operation antage o ata sets. ns on da	tems, C king, te stem: tr of each and fu n, Type nodules ngs, Ni ns, Lin of usir taset: F	Goals and elecomme raining a iew of su algorith unction: i es of fun s. umPy: Ne ear alge ng Pytho Reading	l appl unicat nd te upervi m. f-elif- ctions umPy bra a on lit	ications of icon, digital sting data, sed, semi- else, while s, Function operation, nd related oraries for rriting data
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1	2 3 2	3 3 2 Introdu machir market concep superv Basics loop, fo argume Python Array a operati implem Pandas files, p	1 – 1 action to action to acti	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break an bda fun ructures operatio ng pyth <u>Aachine</u> me and ppend,	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S consection ferent fie Aspects of a function ed learnin duction the d contin ctions, F s: Lists, " on, Matr non. Un Learning data fran insert, r	ing - Def elds such of develo on appros ng algorit to Python nue, Intro ile Handli Tuples, D ix and as derstand g models. me relate replace, o	t; <b>3 – Stron</b> fining lear as health c ping a lear kimation, a hms and th control s oduction to ing, packag ictionary, s ssociated of the adva Types of da d operation fropping of	g ning syst are, bank ming syst general ac usage structure o functio ges and m Sets, stri operation antage o ata sets. ns on dar columns	eems, C king, te stem: tr overvi of each and fu n, Type nodules ngs, Ni ns, Lin of usir taset: F from	Goals and elecommu- raining a iew of su algorith unction: i es of fun s. umPy: N ear alge ng Pytho Reading datafram	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a on lit	ications of icon, digital sting data, sed, semi- else, while s, Function operation, nd related oraries for rriting data oupby and
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1	2 3 2	3 3 2 Introdu machir market concep supervi Basics loop, fo argume Python Array a operati implem Pandas files, p aggreg	1 – action to be learning ing and ot repression ised, uns of Pytho or loop, ents, Lan Data Sta and its isenting N data fra andas a ate func	2 Reasona Machir o Machir ng in diff so on. A entation upervise n: Introo break an bda fun ructures operation ng pyth Aachine me and ppend, ction, jo	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S consection ferent fie Aspects of a function ded learning duction t ductions, F s: Lists, 7 on, Matr hon. Un Learning data fran insert, r in oper	ing - Def elds such of develo on approx ng algorit to Python nue, Intro ïle Handli Tuples, D ix and as derstand g models. me relate replace, c ations, E	t; <b>3 – Stron</b> fining learr as health c ping a lear kimation, a hms and th t, Control s oduction to ing, packag ictionary, S ssociated of the adva Types of da d operation dropping of xploratory	g ning syst are, bank rning syst general e usage tructure o functio ges and m Sets, stri operation antage o ata sets. ns on da columns data a	eems, C king, te stem: tr of each and fu n, Type nodules ngs, Ni ns, Lin of usin taset: F from o nalysis	Goals and elecommunity raining a iew of su algorith unction: i es of fun s. umPy: Nu ear alge ag Pytho Reading datafram , Data p	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a on lit and w e, gro	ications of cion, digital sting data, sed, semi- relse, while s, Function operation, nd related oraries for rriting data oupby and ration and
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1 Unit: 2	2 3 2	3 3 2 Introdu machin market concep supervi Basics loop, fo argume Python Array operati implem Pandas files, p aggreg prepro	1 – action to action	2 Reasona Machir o Machir ng in diff so on. A entation upervise n: Introo break an bda fun ructures operation ng pyth Aachine me and ppend, ction, jo	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S consection ferent fie Aspects of a function ded learning duction t ductions, F s: Lists, 7 on, Matr hon. Un Learning data fran insert, r in oper	ing - Def elds such of develo on approx ng algorit to Python nue, Intro ïle Handli Tuples, D ix and as derstand g models. me relate replace, c ations, E	t; <b>3 – Stron</b> fining learr as health c ping a lear kimation, a hms and th t, Control s oduction to ing, packag ictionary, S ssociated of the adva Types of da d operation dropping of xploratory	g ning syst are, bank rning syst general e usage tructure o functio ges and m Sets, stri operation antage o ata sets. ns on da columns data a	eems, C king, te stem: tr of each and fu n, Type nodules ngs, Ni ns, Lin of usin taset: F from o nalysis	Goals and elecommunity raining a iew of su algorith unction: i es of fun s. umPy: Nu ear alge ag Pytho Reading datafram , Data p	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a on lit and w e, gro	ications of cion, digital sting data, sed, semi- relse, while s, Function operation, nd related oraries for rriting data oupby and ration and
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1 Unit: 2	2 3 2	3 3 2 Introdu machir market concep supervi Basics loop, fo argume Python Array a operati implem Pandas files, p aggreg prepro measu	<b>1</b> – <b>1</b> –	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break ar bda fun ructures operation ng pyth <u>Machine</u> me and ppend, ction, jo (Dealing	2 3 ble; 2 – S ble; 3	ing - Def elds such of develo on approx ng algorit to Python nue, Intro Tuples, D ix and as derstand g models. me relate replace, c ations, E nissing va	fining learn as health of ping a learn kimation, a hms and the control so oduction to ing, packag ictionary, S ssociated of the adva <u>Types of de</u> d operation fropping of xploratory alue, cross	g ning syst care, bank rning syst a general be usage of functio ges and m Sets, stri operation antage of ata sets. ns on data columns data a s-validati	ems, C king, te stem: tr overvi of each and fu n, Type nodules ngs, Ni ns, Lin of usir taset: F from nalysis on, cla	Goals and elecomme raining a iew of su algorith inction: i es of fun s. umPy: Ne ear alge ag Pytho Reading datafram , Data p ssificatio	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a on lit and w e, gru orepai on, pe	ications of icon, digital sting data, sed, semi- else, while s, Function operation, nd related oraries for rriting data oupby and cation and erformance
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1 Unit: 2	2 3 2	3 3 2 Introdu machin market concep superv Basics loop, fo argume Python Array operati implem Pandas files, p aggreg prepro measur Data vi	<b>1</b> – <b>1</b> –	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break ar bda fun ructures operation ng pyth <u>Aachine</u> me and ppend, ction, jo (Dealing	2 3 ble; 2 – S ble; 3	ing - Def elds such of develo on approx ng algorit to Python nue, Intro Tuples, D ix and as derstand g models. me relate replace, c ations, E nissing va ing matpl	fining learn as health of ping a learn kimation, a hms and the control so oduction to ing, packag ictionary, S ssociated of the adva <u>Types of de</u> d operation fropping of xploratory alue, cross	g ning syst care, bank rning syst a general be usage of functio ges and m Sets, stri operation antage of ata sets. ns on data columns data a s-validati	ems, C king, te stem: tr overvi of each and fu n, Type nodules ngs, Ni ns, Lin of usir taset: F from nalysis on, cla	Goals and elecomme raining a iew of su algorith inction: i es of fun s. umPy: Ne ear alge ag Pytho Reading datafram , Data p ssificatio	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a on lit and w e, gru orepai on, pe	ications of icon, digital sting data, sed, semi- else, while s, Function operation, nd related oraries for rriting data oupby and cation and erformance
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1 Unit: 2	2 3 2	3 3 2 Introdu machin market concep superv Basics loop, fo argume Python Array a operati implem Pandas files, p aggreg prepro measu Data vi Bar plo	1 – 2 action to the learning ing and the repressive ised, uns of Pytho or loop, ents, Lan Data Sta and its ons usi benting M data fra andas a ate func- cessing re). sualization t, Histog	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break an ubda fun ructures operation ng pyth <u>Machine</u> me and ppend, ction, jo (Dealing on on da ram, Bor	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S consection ferent fie Aspects of the Learnin ferent fie Aspects of the Learnin duction to the Learnin duction to the Learnin duction to the Learnin duction to the Learnin ferent fie the Learnin the	ing - Def elds such of develo on approx ng algorit to Python nue, Intro "ile Handli Tuples, D ix and as derstand g models. me relate replace, c ations, E nissing va ing matpl air plot.	fining learn as health c ping a learn as health c ping a learn kimation, a hms and th control s oduction to ing, packag ictionary, s sociated of the adva Types of da d operation lropping c xploratory alue, cross otlib and s	g ning syst care, bank ming syst a general ne usage ofunction function ges and m Sets, stri operation antage of ata sets. ns on dar columns data a -validati eaborn li	eems, C king, te stem: tu overvi of each and fu n, Type odules ngs, Ni ns, Lin of usir taset: F from nalysis on, cla braries	Goals and elecomme raining a iew of su algorith unction: i es of fun s. umPy: Ni ear alge ng Pytho Reading datafram , Data p ssificatio s: Scatter	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a bra lit and w e, gro prepar on, pe r plot	ications of ion, digital sting data, sed, semi- else, while s, Function operation, nd related oraries for rriting data oupby and ration and erformance
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1 Unit: 2 Unit: 3	2 3 2	3 3 2 Introdu machir market concep superv Basics loop, fo argume Python Array a operati implem Pandas files, p aggreg prepro measu Data vi Bar plo Regres	<b>1</b> – 1 action to the learning ing and ot repressive ised, uns of Pytho or loop, ents, Lan Data St and its ons usi nenting N data fra andas a ate funct cessing re). sualization t, Histog sion – L	2 Reasona Machir ng in diff so on. A entation upervise n: Introo break an ubda fun ructures operation ng pyth <u>Machine</u> me and ppend, ction, jo (Dealing on on da ram, Bor	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S consection ferent fie Aspects of the Learnin ferent fie Aspects of the Learnin duction to the Learnin duction to the Learnin duction to the Learnin duction to the Learnin ferent fie the Learnin the	ing - Def elds such of develo on approx ng algorit to Python nue, Intro "ile Handli Tuples, D ix and as derstand g models. me relate replace, c ations, E nissing va ing matpl air plot.	fining learn as health c ping a learn ximation, a hms and th control s oduction to ing, packag ictionary, s ssociated of the adva Types of da d operation lropping of xploratory alue, cross otlib and so	g ning syst care, bank ming syst a general ne usage ofunction function ges and m Sets, stri operation antage of ata sets. ns on dar columns data a -validati eaborn li	eems, C king, te stem: tu overvi of each and fu n, Type odules ngs, Ni ns, Lin of usir taset: F from nalysis on, cla braries	Goals and elecomme raining a iew of su algorith unction: i es of fun s. umPy: Ni ear alge ng Pytho Reading datafram , Data p ssificatio s: Scatter	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a bra lit and w e, gro prepar on, pe r plot	ications of ion, digital sting data, sed, semi- else, while s, Function operation, nd related oraries for rriting data oupby and ration and erformance
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1 Unit: 2	2 3 2	3 3 2 Introdu machir market concep superv Basics loop, fo argume Python Array a operati implem Pandas files, p aggreg prepro measu Data vi Bar plo Regres applica	<b>1</b> – 1 iction to the learning ing and ot repression ised, uns of Pytho or loop, ents, Lan Data Sta and its ons using nenting M data frame andas a ate functor cessing re). sualization t, Histog sion – Litions.	2 Reasona Machir ng in diff so on. <i>A</i> entation upervise n: Introo break an bda fun ructures operatio ng pyth <u>Aachine</u> me and ppend, ction, jo (Dealing on on da <u>ram, Bor</u> inear, N	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S consection for the section declearning duction the decontine duction the decontine duction the decontine duction the duction	<b>Eignificant</b> ing - Defelds such of develo on approxing algorit to Python nue, Intro- ile Handli Tuples, D ix and as derstand g models. me relate replace, o ations, E nissing va ing matpl air plot. ar, Logist	t; 3 – Stron fining learn as health c ping a lean kimation, a hms and th control s oduction to ing, packag ictionary, 9 ssociated of the adva Types of da d operation dropping of xploratory alue, cross otlib and s ic regressi	g ning syst are, bank rning syst general ac usage structure o functio ges and m Sets, stri operation antage o ata sets. ns on data columns data a s-validati eaborn li	ems, C king, te stem: tr overvi of each and fu n, Type nodules ngs, Ni ns, Lin of usin taset: F from o nalysis on, cla braries	Goals and Elecomme raining a iew of su algorith unction: i es of fun a. umPy: Ne ear alge ng Pytho Reading datafram , Data p issificatio a: Scatte le regre	l appl unicat nd te ipervi m. f-elif- ctions bra a bn lit and w e, gro prepar on, pe r plot	ications of ications of cion, digital sting data, sed, semi- else, while s, Function operation, nd related oraries for rriting data oupby and ration and erformance c, Line plot, and their
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1 Unit: 2 Unit: 3	2 3 2	3 3 2 Introdu machir market concep supervi Basics loop, fe argume Python Array s operati implem Pandas files, p aggreg prepro measu Data vi Bar plo Regres applica Classifi	1 - 1 action to be learning ing and ot repression ised, unsolution of Pytho or loop, ents, Lan Data Sta and its isenting N data fra andas a ate functor cessing re). sualization t, Histog sion - L tions. cation to	2 Reasona Machir o Machir ng in diff so on. A entation upervise n: Introo break an bda fun ructures operatio ng pyth Aachine me and ppend, ction, jo (Dealing on on da ram, Boy inear, N	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S che Learn ferent fie Aspects of a, function ed learning duction the duction	ing - Def elds such of develo on approx ng algorit to Python nue, Intro "ile Handli Tuples, D ix and as derstand g models. me relate replace, c ations, E nissing va ing matpl air plot. ar, Logist	t; <b>3 – Stron</b> fining lear as health c ping a lear kimation, a hms and th , Control s oduction to ing, packag ictionary, S ssociated of the adva Types of da d operation dropping of xploratory alue, cross otlib and s ic regress	g ning syst are, bank rning syst general e usage tructure o functio ges and m Sets, stri operation antage o ata sets. ns on da columns data a e-validati eaborn li ion and ees- Min	tems, C king, te stem: tr of each and fu n, Type nodules ngs, Ni ns, Lin of usin taset: F from o nalysis on, cla braries Multip	Goals and elecommunity raining a iew of su algorith unction: i es of fun algorith unction: i es	and we, groprepart	ications of cion, digital sting data, sed, semi- relse, while s, Function
Outcomes CO1 CO2 CO3 CO4 Detailed Conten Unit: 1 Unit: 2 Unit: 3	2 3 2	3 3 2 Introdu machin market concep supervi Basics loop, fe argume Python Array a operati implem Pandas files, p aggreg prepro measu Data vi Bar plo Regres applica Classifi Gain, E	1 – Iction to the learning ing and the repression of Pytho or loop, ents, Lan Data Sta and its ised, uns of Pytho or loop, ents, Lan Data Sta and its isenting M data fra andas a ate functor cessing re). sualization t, Histog sion – L tions. cation to ntropy, 0	2 Reasona Machir o Machir ng in diff so on. A entation upervise n: Introo break an ibda fun ructures operation ng pyth <u>Aachine</u> me and ppend, ction, jo (Dealing on on da ram, Boy inear, N echnique Cross Va	2 3 3 ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S ble; 2 – S consection ferent fie Aspects of a function ded learning duction the duction	ing - Def elds such of develo on approx ng algorit to Python nue, Intro 'ile Handli Tuples, D ix and as derstand g models. me relate replace, o ations, E nissing va ing matpl air plot. ar, Logist	fining learn as health or ping a learn as health or ping a learn aimation, a hms and the t, Control so oduction to ing, packag ictionary, S ssociated or the adva Types of di d operation dropping or xploratory alue, cross otlib and so ic regressi ecision Tre- rent classifi	g ning syst are, bank rning syst a general a usage structure o function ges and m Sets, stri operation antage of ata sets. ns on da columns data a -validati eaborn li ion and cees- Min ication a	terms, C king, te stem: tr of each and fu n, Type nodules ngs, Ni ns, Lin of usir taset: F from o nalysis on, cla braries Multip imum ccurac	Goals and elecommunity raining a iew of su algorith inction: i es of fun s. umPy: Ni ear alge ag Pytho Reading datafram , Data p issificatio s: Scatte le regre Descript y metrics	l appl unicat nd te ipervi m. f-elif- ctions umPy bra a on lit and w e, gro orepat on, pe r plot ssion, ion. It	ications of ications of cion, digital sting data, sed, semi- else, while s, Function operation, nd related oraries for rriting data oupby and ration and erformance c, Line plot, and their

	Clustering, Hierarchical Clustering, and Density-based Clustering.
	Support Vector Machines: Maximum margin linear separators. Kernels for learning non-
	linear functions. Bayesian Learning: theory and Bayes rule. Naive Bayes learning algorithm.
	Parameter smoothing. Bayes nets and Markov nets for representing dependencies.
Exan	nination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class sessional
exam	ns/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
exam	nination.
Text	Books:
1	Tom Michel, Machine Learning, McGraw Hill, 1997.
2	Introduction to Machine Learning with Python, Andreas C. Mueller.
3	Mastering Python for data science, Samir Madhavan.
Refe	rence Books:
1	Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ
	Press.
2	McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and iPython.

	Course Cod	e			C	lourse Ti	itle			Lect	ture		
Ν	ATCS260PC	CP		Machi	ne Lear	ning wit	th Pytho	on - Lab		L	Т Р	P Semester	
Versio	on: 1.2						BoS 17-1			0	0 4		
		Scheme	of Instru	uction					Scheme	e of Exam	ination		
	No. of	Periods	: 60	Hrs.						Maximu	m Score	: 100	)
	Periods	/ Week	: 4						In	ternal Eva	aluation	: 50	
	,	Credits	: 2							End Se	emester	: 50	
	Instructio		: Pra	actical							uration	: 3 F	Irs.
Prerec	quisite(s): Ki				science	algorit	hms.					1 1	
	e Objectives		, ,			0							
	understand		ic conce	pts and t	echniqu	es of ma	chine lea	arning th	rough py	hon prog	grammin	g.	
2. То	o develop ski	ills of usi	ng recer	ıt machiı	ne learni	ng packa	ages for s	solving p	actical p	roblems.			
3. То	o gain experi	ience of o	doing ind	depende	nt study	and rese	earch.	01	-				
	design and		-	-	•								
	e Outcomes				0 0								
	os No.	<b>X</b> /			ç	Statemer	nt				Mar	ped Pro	gram
												tcomes (	
(		Able to d	emonstr	ate pyth	on packa	ages						PO <sub>1</sub> , PO	2
(		Able to g					t data us	ing pytho	n			PO <sub>2</sub> , PO	3
(		Use Pyth									P	$\mathbf{D}_2, \mathbf{PO}_3, \mathbf{D}_2$	
	1	learning	applicati	ions.	1								
(	CO4	Impleme	nt an en	d-to-end	l machir	ie learnii	ng syster	n			<b>PO</b> <sub>2</sub> ,	PO <sub>3</sub> , PO	4, <b>PO</b> 5
	ngineering Kr												
	ms, <b>PO</b> 5- Mod										PO8- Ethio	cs, <b>PO</b> 9- I	ndividu
or tean	n work, <b>PO</b> 10-	Commun	ication, <b>P</b>										
	-			Марри	ng of cou	irse outc	comes wi	th progra	am outco	mes			1
	Course	PO <sub>1</sub>	$PO_2$	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	<b>PO</b> <sub>11</sub>	PO <sub>1</sub>
Ou	itcomes	4	4										
	CO <sub>1</sub>	1	1	0									
			3	2	0								
	CO <sub>3</sub>		2	3	2	0							-
	CO <sub>4</sub>		2	3	2	2		4.0 GL					
Datail	ed Contents	~		1 - 1	keasonai	ole; 2 - Si	ignijican	t; 3 – Str	ong				
			d on the	aullahua	nnocori	had for 1	Vachina	loonning	algorith	musing	wthon		
	<b>periments</b> a sic data stru							learning	aigoritii	in using j	python.		
	rite the pyth							nort ron	nekara in	nython)			
	rite the pyth												
	rite a pytho			0					1				
	plementatio										oth corre	ect and w	rong
	edictions. P								is data se				nong
	plement the								ed to buil	d classifi	cation m	odels.	
	plement the												
	plementatio						1	,	,	-,	- <b>j</b>		
	plementatio					orithm. V	Use an ar	opropriat	e data se	t for build	ling the	decision	tree
	d apply this				0		1				0		
	plementatio												
	plementatio						e training	g data set	stored a	s a.CSV fi	le. Comp	ute the	
ac	curacy of th	e classifi	er, cons	idering f	ew test o	lata sets							
	plementatio												
	plementatio							od.					
3. Im	plement the								order to	fit data p	oints. Se	elect	
	propriate da	ata set fo	r your e	xperime	nt and di	raw grap	hs.			_			
4. Im	propriate a	0.0.100	erent m	ulti-class	s SVM te					orary.			
4. Im ap 5. Im	plementatio												
4. Im ap 5. Im 6. Ca	plementationse study: Pr	edicting	the pric	e of pre-									
4. Im ap 5. Im 6. Ca 7. Im	plementationse study: Proplementationse study:	edicting	the pric	e of pre-						lote: Take	e your ov	n datase	et of
4. Im ap 5. Im 6. Ca 7. Im yo	aplementations ase study: Pr aplementation pur choice).	edicting on of CNI	the pric N using '	e of pre- Tensorflo	ow/Kera	as library	and clas	sify the l	mages (N	lote: Take	e your ov	vn datase	et of
<ol> <li>Im ap</li> <li>Im</li> <li>Ca</li> <li>Ca</li> <li>T</li> <li>Im</li> <li>yo</li> <li>Im</li> </ol>	plementationse study: Proplementationse study:	edicting on of CNI	the pric N using ' d search	e of pre- Fensorflo and Ran	ow/Kera dom sea	is library Irch usin	and clas	ssify the l c Regres	mages (N		-		

exam	nination.
Text	Books:
1	Mastering python for data science, Samir Madhavan
2	Introduction to linear algebra - by Gilbert Strang
3	Machine Learning using Python, U Dinesh Kumar Manaranjan Pradhan
Refe	rence Books:
1	Applied statistics and probability for engineers – by Douglas Montgomery
2	McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media

	de									ecture	ture		
MTCS311P	СТ			De	eep Lear	ming			L	Т	Р	Seme	ster: III
Version: 1.2				of Appro	<b>oval:</b> 16th	n BoS 17-1			4	0	0		
	Scheme	of Instru	iction					Scheme	of Exa	minat	ion		
	of Periods	: 60	Hrs.						/laximu			:	100
Period	ls/Week	: 4						Inte	rnal E			:	30
	Credits	: 4								Semes		:	70
	ion Mode		eture						Exam	Durati	ion	:	3 Hrs.
Prerequisite(s): N		Learning	5										
Course Objective		toxt of p	oural not	workaar	nd doop	loarning							
2. To understan							ing						
<ol> <li>To gain work</li> </ol>						1	<u>.</u>						
4. To Explore th	-	-			ina acop	ieu iiigi							
Course Outcome													
COs No.				S	tatemen	t				]	Map	ped Pro	gram
												comes (	-
CO <sub>1</sub>		and the b		-	-	0				I	<b>PO</b> 1,	PO2, PO	3, <b>PO</b> 4
CO <sub>2</sub>						ning algori						PO <sub>3</sub> , PO	
CO <sub>3</sub>			Apply CN	JN and R	NN in si	mulation	for real-	world		F	PO <sub>3</sub> ,	PO <sub>4</sub> , PO	5, <b>PO</b> 9
	applicat		-	•					~				
CO <sub>4</sub>			enges in	herent ir	n develoj	ping deep	learning	algorith	ms for	P		PO <sub>3</sub> , PO	
<b>PO</b> <sub>1</sub> - Engineering K	differen		lom and		Docion /	dovolonma	nt of colv	tions <b>DO</b>	- Cond	Luot in:		PO11, PO	
problems, <b>PO</b> <sub>5</sub> - Mo													
or team work, PO <sub>10</sub>										, 200			
						omes with							
<b>Course Outcome</b>	s PO <sub>1</sub>	$PO_2$	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	50		DO	DC	<b>)</b>	<b>PO</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>
20	-		-	104	FO <sub>5</sub>	PU <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PC	/10	- • 11	
CO1	2	2	3	3	105	PU <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PC	/10	1011	
CO <sub>2</sub>	2	2 3	3 3	3 2			<b>PO</b> <sub>7</sub>			1	/10		
CO <sub>2</sub> CO <sub>3</sub>	2	3	3 3 3	3 2 2	2			PO <sub>8</sub>	2	1	/10		
$CO_2$	2		3 3 3 3	3 2 2 3	2 3					1	<b>7</b> 10	3	2
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>		3	3 3 3 3	3 2 2 3	2 3	gnificant;				1	210		
CO <sub>2</sub> CO <sub>3</sub>		3	3 3 3 3 1 - R	3 2 2 3 easonabl	2 3 e; 2 - Sig	gnificant;	3 – Stron	ıg	2	1		3	2
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content		3 3 Introd	3 3 3 1 - R uction to	3 2 2 3 easonabl	2 3 e; 2 - Sių	gnificant; g: Basics:	<b>3 – Stror</b> Biologica	<b>ng</b> al Neuro	n, Idea	a of c	omp	3 utation	2 al units,
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>		3 3 Introdu McCul	3 3 3 1 - R uction to loch- Pi	3 2 3 easonabl	2 3 <b>e; 2 – Si</b> Learning and Thi	gnificant; g: Basics: resholdinį	<b>3 – Stron</b> Biologica g logic, 1	<b>ng</b> al Neuro Linear Pe	n, Idea	a of c	omp	3 outation	al units,
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1		3 3 Introdu McCul Algorit	3 3 3 1 - R uction to loch- Pi hm, Line	3 2 3 easonabl tts unit ear separ	2 3 <b>e; 2 – Sių</b> Learning and Thi ability. C	gnificant; g: Basics: resholding Converger	<b>3 – Stron</b> Biologica g logic, 1 ace theor	<b>19</b> al Neuro Linear Pe	n, Idea ercept	a of c ron, P ron Le	omp erce	3 utation ptron I ng Algo	al units, Learning rithm.
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content		3 Introd McCul Algorit Feed f	3 3 1 – R uction to loch– Pi hm, Line	3 2 3 easonabl tts unit ear separ Network	2 3 <b>e; 2 - Sig</b> Learning and Thr ability. C ss: Mul	gnificant; g: Basics: resholdinį	<b>3 – Stron</b> Biologica g logic, l ace theor erceptron	<b>ng</b> al Neuro Linear Pe em for Pe a, Gradie	n, Idea ercept ercept ent De	a of c ron, P ron Le	omp erce	3 utation ptron I ng Algo	al units Learning rithm.
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1		3 3 Introdu Algorit Feed f Empiri Convol	3 3 1 - R uction to loch- Pi hm, Line Forward cal Risk lutional	3 2 3 easonabl b Deep 1 tts unit ear separ Network Minimiza Network	2 3 <b>e; 2 – Si</b> and Thu ability. C cs: Mul ation, reg s: The C	g <b>nificant;</b> g: Basics: resholdinş Convergen tilayer Pe gularizatio Convolutic	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera	al Neuro Linear Pe rem for Pe n, Gradie encoders tion - Va	2 n, Idea ercept ercept ent De ariants	a of c ron, P ron Le scent, of the	omp erce arni , Bao e Ba	3 putation ptron I ng Algo ck prop sic Con	al units, Learning rithm. agation
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1		3 Introdu McCul Algorit Feed f Empiri Convol Functio	3 3 1 - R uction to loch- Pi hm, Line orward cal Risk lutional on - Stru	3 2 3 easonabl o Deep 1 tts unit car separ Network Minimiza Network uctured (	2 3 e; 2 – Sig and Thr ability. C as: Mul ation, reg s: The C Dutputs	gnificant; g: Basics: resholding Convergen tilayer Pe gularizatic Convolutic - Data Ty	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Efl	al Neuro Linear Pe rem for Pe n, Gradie encoders tion - Va	2 n, Idea ercept ercept ent De ariants	a of c ron, P ron Le scent, of the	omp erce arni , Bao e Ba	3 putation ptron I ng Algo ck prop sic Con	al units Learning rithm. agation
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1 Unit: 2		3 Introdu McCul Algorit Feed f Empiri Convol Functio or Uns	3 3 3 1 - R uction to loch- Pi hm, Line forward cal Risk lutional on - Stru upervise	3 2 3 easonabl o Deep 1 tts unit ear separ Network Minimiza Network uctured ( d Featur	2 3 Learning and Thr ability. C ss: Mul ation, reg s: The C Dutputs es- LeNo	gnificant; g: Basics: resholding Convergen tilayer Pe gularizatic Convolutic - Data Ty et, AlexNe	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Eff	ng al Neuro Linear Pe em for Pe n, Gradie encoders tion - Va ficient Co	2 n, Idea ercept ercept ent De ariants	a of c ron, P ron Le scent, of the	omp erce earni , Bao e Ba Igori	3 putation ptron I ng Algo ck prop sic Con thms -	al units Learning rithm. agation volutior Random
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1 Unit: 2		3 Introdu McCul Algorit Feed f Empiri Convol Function or Uns Recurr	3 3 3 1 - R uction to loch- Pi hm, Line orward cal Risk lutional on - Stru upervise rent Neu	3 2 3 easonabl o Deep 1 tts unit car separ Network Minimiza Network ictured ( d Featur ral Netw	2 3 e; 2 – Sig Learning and Thr ability. C as: Mul ation, reg s: The C Dutputs es- LeNe vorks: B	gnificant; g: Basics: resholding Convergen tilayer Pe gularizatio Convolutic - Data Ty et, AlexNe idirection	<b>3 – Stron</b> Biologica g logic, l ace theor erceptron on, auto e on Opera pes – Eff et al RNNs	ng al Neuro Linear Pe em for Pe n, Gradie encoders tion - Va ficient Co - Deep	n, Idea ercept ercept ariants onvolu Recu	a of c ron, P ron Le scent, of the tion A	omp erce earni , Bao e Ba Igori Netw	3 putation ptron I ng Algo ck prop sic Con thms -	al units Learning rithm. agation volutior Random
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3		3 Introdu McCul Algorit Feed f Empiri Convol Function or Uns Recurr Neural	3 3 1 – R uction to loch – Pi hm, Line forward cal Risk lutional on – Stru upervise rent Neu Networ	3 2 3 easonabl o Deep 1 tts unit car separ Network Minimiza Network ictured ( d Featur ral Netw ks – The	2 3 e; 2 – Sig Learning and Thr ability. C as: Mul ation, reg s: The C Dutputs es- LeNe vorks: B Long Sh	gnificant; g: Basics: resholding Converger tilayer Pe gularizatic Convolutic - Data Ty et, AlexNe idirection ort-Term	<b>3 – Stron</b> Biologica g logic, l ace theor erceptron on, auto e on Opera pes – Eff et al RNNs Memory	ng al Neuro Linear Pe em for Pe n, Gradie encoders tion - Va ficient Co - Deep y and Oth	n, Idea ercept ercept ent De ariants onvolu Recun	a of c ron, P ron Le scent, of the tion A rent 1 ced RN	ompp erce earni , Bao e Ba lgori Netw [Ns	3 putationa pptron I ng Algo ck prop sic Con thms - vorks R	al units Learning rithm. bagation volution Random
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3		3 Introdu McCul Algorit Feed f Empiri Convol Functio or Uns Recurr Neural Deep	3 3 1 - R uction to loch- Pi hm, Line orward cal Risk lutional on - Stru upervise rent Neu Networ Generat	3 2 3 easonabl o Deep 1 tts unit car separ Network Minimiza Network Minimiza Network uctured ( d Featur ral Netw ks – The ive Mod	2 3 e; 2 - Sig and Thi ability. C as: Mul ation, reg s: The C Outputs es- LeNo vorks: B Long Sh lels: Bol	gnificant; g: Basics: resholdiną Convergen tilayer Pe gularizatio Convolutio - Data Ty et, AlexNe idirection ort-Term tzmann	<b>3 – Stron</b> Biologica g logic, l ace theor erceptron on, auto e on Opera pes – Eff et al RNNs <u>Memory</u> Machines	al Neuro Linear Pe em for Pe n, Gradie encoders tion - Va ficient Co - Deep v and Oth s - Rest	n, Idea ercept ercept ent De ariants onvolu Recun er Gat tricted	a of c ron, P ron Le scent, of the tion A rent 1 rent 1 rent 1 rent 1 rent 1 rent 1	omp erce earni , Bao e Ba lgori Netw (Ns zmai	3 putation ptron I ng Algo ck prop sic Con thms - vorks R	al units Learning rithm. bagation volutior Random ecursive
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3		3 Introdu McCul Algorit Feed f Empiri Convol Functio or Uns Recurr Neural Deep Introdu	3 3 3 1 - R uction to loch- Pi hm, Line forward cal Risk lutional on - Stru upervise rent Neu Networl Generat uction to	3 2 3 easonabl o Deep 1 tts unit ear separ Network Minimiza Network uctured ( d Featur ral Netw ks – The ive Mod o MCMC	2 3 e; 2 - Sig and Thi ability. C ss: Mul ation, reg s: The C Outputs es- LeNa vorks: B Long Sh lels: Bol and Gib	gnificant; g: Basics: resholding Convergen tilayer Pe gularizatio Convolutic - Data Ty et, AlexNe idirection ort-Term tzmann bs Sampli	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Eff al RNNs Memory Machines ng- grad	al Neuro Linear Pe em for Pe n, Gradie encoders tion - Va ficient Co - Deep v and Oth s - Rest lient com	n, Idea ercept ercept ariants onvolu Recun her Gat tricted	a of c ron, P ron Le scent, of the tion A rent 1 rent 1 rent 1 rent 1 rent 1 rent 1 rent 1 rent 1	omp erce earni gori Netw Ns zman I RBN	3 ptron I ng Algo ck prop sic Con thms - vorks R nn Mac Ms Appl	al units Learning rithm. agation volutior Random ecursive
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4		3 Introdu McCull Algorit Feed f Empiri Convol Functio or Uns Recurr Neural Deep Introdu Large-	3 3 3 1 - R uction to loch- Pi hm, Line forward cal Risk lutional on - Stru upervise rent Neu Networ Generat uction to Scale D	3 2 3 easonabl o Deep 1 tts unit car separ Network Minimiza Network nctured ( d Featur rral Netw ks – The ive Mod o MCMC eep Lea	2 3 e; 2 – Sig and Thu ability. C ss: Mul ation, reg s: The C Outputs es- LeNo vorks: B Long Sh lels: Bol and Gib rning –	gnificant; grificant; resholding Convergen tilayer Pe gularizatio Convolutic - Data Ty et, AlexNe idirection ort-Term tzmann bs Sampli Comput	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Eff al RNNs Memory Machines ng- grad	al Neuro Linear Pe em for Pe n, Gradie encoders tion - Va ficient Co - Deep v and Oth s - Rest lient com	n, Idea ercept ercept ariants onvolu Recun her Gat tricted	a of c ron, P ron Le scent, of the tion A rent 1 rent 1 rent 1 rent 1 rent 1 rent 1 rent 1 rent 1	omp erce earni gori Netw Ns zman I RBN	3 ptron I ng Algo ck prop sic Con thms - vorks R nn Mac Ms Appl	al units Learning rithm. agation volutior Random ecursive
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5	ts:	3 Introdu McCull Algorit Feed f Empiri Convol Functio or Uns Recurr Neural Deep Introdu Large- Proces	3 3 3 1 - R uction to loch- Pi hm, Line forward cal Risk lutional on - Stru upervise rent Neu Networ Generat uction to Scale D ssing - O	3 2 3 easonabl o Deep 1 tts unit car separ Network Minimiza Network nctured ( d Featur ral Netw ks – The ive Mod o MCMC eep Lea ther App	2 3 e; 2 – Sig and Thu ability. C ss: Mul ation, reg s: The C Outputs es- LeNo vorks: B Long Sh lels: Bol and Gib rning – lications	gnificant; grificant; cesholdinş Convergen tilayer Pe gularizatio convolutic - Data Ty et, AlexNe idirection ort-Term tzmann tzmann bs Sampli Comput	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptror on, auto e on Opera pes - Eff al RNNs Memory Machines ng- grad er - Sp	al Neuro Linear Pe rem for Pe n, Gradie encoders tion - Va ficient Co - Deep and Oth s - Rest lient com eech Re	2 n, Idea ercept ercept ariants onvolu Recun tricted putati	a of c ron, P ron Le scent, of the tion A rrent 1 red RN Boltz ons in ion -	omp erce earni gori lgori Netw Ns zman a RBN Na	3 putation ptron I ng Algo ck prop sic Con thms - vorks R nn Mac Ms Appl tural L	al units Learning rithm. agation volutior Random ecursive chines - ications anguage
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and	ts:	3 Introdu McCul Algorit Feed f Empiri Convol Function or Uns Recurr Neural Deep Introdu Large- Proces on Patte	3 3 3 1 - R uction to loch - Pi hm, Line forward cal Risk lutional on - Stru upervise rent Neu Networf Generat uction to Scale D ssing - Or ern: It in	3 2 3 easonabl o Deep 1 tts unit car separ Network net	2 3 e; 2 – Sig and Thu ability. C and Thu ability. C s: Mul ation, reg s: The C Dutputs es- LeNo vorks: B Long Sh lels: Bol and Gib rning – lications oth inter	gnificant; gnificant; cesholding Convergen tilayer Pe gularizatio Convolutio - Data Ty et, AlexNe idirection ort-Term tzmann bs Sampli Comput	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Eff al RNNs Machines ng- grad er - Sp ation (30	al Neuro Linear Pe em for Pe n, Gradie encoders tion - Va ficient Co - Deep and Oth s - Rest lient com eech Re	2 n, Idea ercept ercept ercept ariants onvolu Recun er Gat tricted oputati comp	a of c ron, P ron Le scent, of the tion A rent 1 	omp ercee earni gori e Ba lgori Netw Na Na Na two	3 putation ptron I ng Algo ck prop sic Con thms - vorks R vorks R n Mac Ms Appl tural L class s	al units Learning rithm. vagation volutior Random ecursive chines chines anguage
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment examination.	ts:	3 Introdu McCul Algorit Feed f Empiri Convol Function or Uns Recurr Neural Deep Introdu Large- Proces on Patte	3 3 3 1 - R uction to loch - Pi hm, Line forward cal Risk lutional on - Stru upervise rent Neu Networf Generat uction to Scale D ssing - Or ern: It in	3 2 3 easonabl o Deep 1 tts unit car separ Network net	2 3 e; 2 – Sig and Thu ability. C and Thu ability. C s: Mul ation, reg s: The C Dutputs es- LeNo vorks: B Long Sh lels: Bol and Gib rning – lications oth inter	gnificant; gnificant; cesholding Convergen tilayer Pe gularizatio Convolutio - Data Ty et, AlexNe idirection ort-Term tzmann bs Sampli Comput	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Eff al RNNs Machines ng- grad er - Sp ation (30	al Neuro Linear Pe em for Pe n, Gradie encoders tion - Va ficient Co - Deep and Oth s - Rest lient com eech Re	2 n, Idea ercept ercept ercept ariants onvolu Recun er Gat tricted oputati comp	a of c ron, P ron Le scent, of the tion A rent 1 	omp ercee earni gori e Ba lgori Netw Na Na Na two	3 putation ptron I ng Algo ck prop sic Con thms - vorks R vorks R n Mac Ms Appl tural L class s	al units Learning rithm. vagation volutior Random ecursive chines chines anguage
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignme examination. Text Books:	ts: I Evaluati ents/ quiz	3 Introdu McCul Algorit Feed f Empiri Convol Functio or Uns Recurr Neural Deep Introdu Large- Proces on Patte	3 3 1 - R uction to loch- Pi hm, Line orward cal Risk lutional on - Stru upervise rent Neu Networf Generat uction to Scale D ssing - O ern: It in ar preser	3 2 3 easonabl o Deep 1 tts unit ear separ Network Minimiza Network Minimiza Network ictured ( d Featur ral Netw ks – The ive Mod o MCMC eep Lea ther App icclude bo ntation e	2 3 e; 2 - Sig and Thi ability. C ss: Mul ation, reg s: The C Outputs es- LeNa vorks: B Long Sh lels: Bol and Gib and Gib rning - lications oth inter tc. and e	gnificant; g: Basics: resholdinş Convergen tilayer Pe gularizatio Convolutic - Data Ty et, AlexNe idirection ort-Term tzmann bs Sampli Comput comput	<b>3 – Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes – Eff al RNNs Memory Machines ng– grad er – Sp ation (30 valuation	al Neuro Linear Pe em for Pe n, Gradic encoders tion - Va ficient Co - Deep v and Oth s - Rest lient com eech Re 0 marks) (70 mark	2 n, Idea ercept ercept ercept ariants onvolu Recun er Gat tricted oputati comp	a of c ron, P ron Le scent, of the tion A rent 1 	omp ercee earni gori e Ba lgori Netw Na Na Na two	3 putation ptron I ng Algo ck prop sic Con thms - vorks R vorks R n Mac Ms Appl tural L class s	al units Learning rithm. volution Randon ecursive chines ications anguage
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignme examination. Text Books: 1 Goodfello	ts: I Evaluati ents/ quiz	3 Introdu McCul Algorit Feed f Empiri Convol Functio or Uns Recurr Neural Deep Introdu Large- Proces on Patter / semina	3 3 3 1 - R uction to loch- Pi hm, Line forward cal Risk lutional on - Stru upervise rent Neu Networf Generat uction to Scale D ssing - O ern: It in ar preser	3 2 3 easonabl o Deep 1 tts unit ear separ Network Minimiza Network Minimiza Network d Featur ral Netw ks – The ive Mod o MCMC eep Lea ther App Iclude bo ntation e	2 3 e; 2 - Sig and Thi ability. C s: Mul ation, reg s: The C Outputs es- LeNa vorks: B Long Sh lels: Bol and Gib rning - lications oth inter tc. and e	gnificant; g: Basics: resholding Convergen tilayer Pe gularizatio Convolutic - Data Ty et, AlexNe idirection ort-Term tzmann bs Sampli Comput sternal evalu external evalu	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Eff al RNNs Memory Machines ng- grad er - Sp ation (30 valuation Press,20	al Neuro Linear Perent cem for Perent of Gradie encoders tion - Va ficient Co - Deep y and Oth s - Rest lient com eech Re 0 marks) (70 mark	2 n, Idea ercept ercept ent De ariants onvolu Recun tricted putati comp ts) whi	a of c ron, P ron Le scent, of the tion A rent 1 ced RN Boltz ons in ion - rising ch is r	omp eerce earnii , Bao e Ba lgori Netw [Ns zman Na Na two nain	3 outation optron I ng Algo ck prop sic Con thms - vorks R on Mac Ms Appl tural L class s ly end s	al units Learning rithm. agation volution Randon ecursive chines ications anguage essiona emester
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignme examination. Text Books:	ts: ts: ts: ts: ts: ts: ts: ts:	3 Introdu McCul Algorit Feed f Empiri Convol Functio or Uns Recurr Neural Deep Introdu Large- Proces on Patter / semina	3 3 3 1 - R uction to loch- Pi hm, Line forward cal Risk lutional on - Stru upervise rent Neu Networf Generat uction to Scale D ssing - O ern: It in ar preser	3 2 3 easonabl o Deep 1 tts unit ear separ Network Minimiza Network Minimiza Network d Featur ral Netw ks – The ive Mod o MCMC eep Lea ther App Iclude bo ntation e	2 3 e; 2 - Sig and Thi ability. C s: Mul ation, reg s: The C Outputs es- LeNa vorks: B Long Sh lels: Bol and Gib rning - lications oth inter tc. and e	gnificant; g: Basics: resholding Convergen tilayer Pe gularizatio Convolutic - Data Ty et, AlexNe idirection ort-Term tzmann bs Sampli Comput sternal evalu external evalu	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Eff al RNNs Memory Machines ng- grad er - Sp ation (30 valuation Press,20	al Neuro Linear Perent cem for Perent of Gradie encoders tion - Va ficient Co - Deep y and Oth s - Rest lient com eech Re 0 marks) (70 mark	2 n, Idea ercept ercept ent De ariants onvolu Recun tricted putati comp ts) whi	a of c ron, P ron Le scent, of the tion A rent 1 ced RN Boltz ons in ion - rising ch is r	omp eerce earnii , Bao e Ba lgori Netw [Ns zman Na Na two nain	3 outation optron I ng Algo ck prop sic Con thms - vorks R on Mac Ms Appl tural L class s ly end s	al units Learning rithm. agation volutior Random ecursive chines - ications anguage eessiona emester
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 2 Unit: 3 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignme examination. Text Books: 1 Goodfello 2 Bengio, Ya (2009):1127	ts: ts: ts: ts: ts: ts: ts: ts:	3 Introdu McCul Algorit Feed f Empiri Convol Functio or Uns Recurr Neural Deep Introdu Large- Proces on Patter / semina	3 3 3 1 - R uction to loch- Pi hm, Line forward cal Risk lutional on - Stru upervise rent Neu Networf Generat uction to Scale D ssing - O ern: It in ar preser	3 2 3 easonabl o Deep 1 tts unit ear separ Network Minimiza Network Minimiza Network d Featur ral Netw ks – The ive Mod o MCMC eep Lea ther App Iclude bo ntation e	2 3 e; 2 - Sig and Thi ability. C s: Mul ation, reg s: The C Outputs es- LeNa vorks: B Long Sh lels: Bol and Gib rning - lications oth inter tc. and e	gnificant; g: Basics: resholding Convergen tilayer Pe gularizatio Convolutic - Data Ty et, AlexNe idirection ort-Term tzmann bs Sampli Comput sternal evalu external evalu	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Eff al RNNs Memory Machines ng- grad er - Sp ation (30 valuation Press,20	al Neuro Linear Perent cem for Perent of Gradie encoders tion - Va ficient Co - Deep y and Oth s - Rest lient com eech Re 0 marks) (70 mark	2 n, Idea ercept ercept ent De ariants onvolu Recun tricted putati comp ts) whi	a of c ron, P ron Le scent, of the tion A rent 1 ced RN Boltz ons in ion - rising ch is r	omp eerce earnii , Bao e Ba lgori Netw [Ns zman Na Na two nain	3 outation optron I ng Algo ck prop sic Con thms - vorks R on Mac Ms Appl tural L class s ly end s	al units Learning rithm. agation volutior Random ecursive chines - ications anguage eessiona emester
CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 2 Unit: 3 Unit: 3 Unit: 4 Examination and exams/ assignme examination. Text Books: 1 Goodfello 2 Bengio, Ye	ts: ts: ts: ts: ts: ts: ts: ts:	3 3 Introdu McCull Algorit Feed f Empiri Convol Function or Uns Recurr Neural Deep Introdu Large- Proces on Patter / semina	3 3 1 - R uction to loch – Pi hm, Line forward cal Risk lutional on – Stru upervise rent Neu Networf Generat uction to Scale D sing – Or ern: It in ar preser	3 2 3 easonabl o Deep 1 tts unit car separ Network network network network network network d Featur rral Network network d Featur rral Network b MCMC eep Lea ther App netude bo ntation e	2 3 e; 2 - Sig and Thu ability. C and Thu ability. C s: Mul ation, reg s: The C Dutputs es- LeNo vorks: B Long Sh lels: Bol and Gib rning - lications oth inter tc. and e epLearn ares for	gnificant; g: Basics: resholding Convergen tilayer Pe gularizatic Convolutic - Data Ty et, AlexNe idirection ort-Term tzmann tzmann bs Sampli Comput s rnal evalu external evalu	<b>3 - Stron</b> Biologica g logic, 1 ace theor erceptron on, auto e on Opera pes - Eff al RNNs Machines ng- grad er - Sp ation (30 valuation	al Neuro Linear Pe em for Pe n, Gradie encoders tion - Va ficient Co - Deep and Oth s - Rest lient com eech Re 0 marks) (70 mark 016. s and tr	2 n, Idea ercept ercept ercept ariants onvolu Recun er Gat tricted oputati compt com	a of c ron, P ron Le scent, of the tion A rent 1 rent 1 red RN Boltz ons in tion - rising ch is r	omp ercee earni , Bac e Ba Igori Netw Na Na Na two nain 	3 outation ptron I ng Algo ck prop sic Con thms - vorks R vorks R n Mac vorks R n Mac dis Appl tural L class s ly end s	al units Learning rithm. vagation volutior Random ecursive chines - ications anguage emester ning 2.2

	de			C	<b>Course T</b>	itle			Lec	Lecture				
MTCS360I	PCP			Deep	o Learni	ng Lab			L	Т	Р	Semester: II		
Version: 1.2			Date	of Appro	oval: 16th	n BoS 17-1	11-2022		0	0	4			
	Scheme	of Instru	uction					Scheme	e of Exam	inatio	n			
No. o	f Periods	: 60	Hrs.						Maximu	m Sco	re	: 100		
Period	ls/ Week	: 4						In	ternal Ev	aluation : 50				
	Credits	: 2							End S	emest	er	: 50		
Instructi	on Mode	: Pra	actical						Exam I	Duratio	on	: 3 H	rs.	
Prerequisite(s):	Knowledg	ge of ba	sic data	science	e algoriti	hms.								
<b>Course Objectiv</b>	es:													
1. To understa	nd the bas	sic conce	epts and	techniqu	ies of de	ep learni	ing throu	igh pytho	n prograi	nming	ç.			
2. To develop s							ing prac	tical prob	lems.					
3. To gain expe						earch.								
<ol><li>To design ar</li></ol>		ent deep	learnin	g algoritl	hms.									
Course Outcome	es (CO):													
COs No.				5	Stateme	nt						ed Prog		
										(		comes (l	,	
CO <sub>1</sub>	Able to d											$PO_1, PO_2$		
$CO_2$	Able to g											$PO_2, PO_3$		
$CO_3$	Use Pyth			implem	ent class	sifiers for	· machin	е			PO	2, PO3, F	$O_4$	
	learning													
CO <sub>4</sub>	Impleme											<b>PO3, PO</b> 4		
problems, <b>PO</b> 5- Me or team work, <b>PO</b> 16	odern tool i o- Commun	usage, <b>PO</b> ication, <b>P</b>	<b>O</b> 11- Proje	ect manag	ement an	r, <b>PO</b> 7- Ên d finance,	<b>PO</b> 12 <sup>-</sup> Life	t and susta e-long Lea	ainability, I rning		thics	s, <b>PO</b> 9- Ir	ndividual	
problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub>	o- Commun	ication, <b>P</b>	O <sub>11</sub> - Proje Mappii	ng of cou	ement an irse outo	7, <b>PO</b> 7- Ēn <sup>.</sup> d finance, comes wi	vironmen , <b>PO</b> 12- Life th progra	t and susta e-long Lea am outco	ainability, I rning mes	<b>РО</b> 8- Е				
problems, <b>PO</b> 5- Mo or team work, <b>PO</b> 10 <b>Course</b> <b>Outcomes</b>	PO1	usage, PC ication, P PO <sub>2</sub>	<b>O</b> 11- Proje	ect manag	ement an	r, <b>PO</b> 7- Ên d finance,	vironmen P <b>O</b> 12- Life	t and susta e-long Lea	ainability, I rning			s, <b>PO</b> 9- Ir <b>PO</b> 11	ndividual PO <sub>12</sub>	
or team work, PO <sub>10</sub>	o- Commun	ication, <b>P</b>	O <sub>11</sub> - Proje Mappin PO <sub>3</sub>	ng of cou	ement an irse outo	7, <b>PO</b> 7- Ēn <sup>.</sup> d finance, comes wi	vironmen , <b>PO</b> 12- Life th progra	t and susta e-long Lea am outco	ainability, I rning mes	<b>РО</b> 8- Е				
or team work, PO <sub>10</sub> Course Outcomes	o- Commun	ication, <b>P</b>	O <sub>11</sub> - Proje Mappii	ng of cou	ement an irse outo	7, <b>PO</b> 7- Ēn <sup>.</sup> d finance, comes wi	vironmen , <b>PO</b> 12- Life th progra	t and susta e-long Lea am outco	ainability, I rning mes	<b>РО</b> 8- Е				
Course Outcomes CO <sub>1</sub>	o- Commun	PO <sub>2</sub>	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3	PO4	ement an irse outo	7, <b>PO</b> 7- Ēn <sup>.</sup> d finance, comes wi	vironmen , <b>PO</b> 12- Life th progra	t and susta e-long Lea am outco	ainability, I rning mes	<b>РО</b> 8- Е				
Course Outcomes CO <sub>1</sub> CO <sub>2</sub>	o- Commun	PO <sub>2</sub>	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3	ect manag ng of cou PO4 2 2	PO5	r, <b>PO</b> 7- Èn d finance, comes wi <b>PO</b> 6	vironmen , PO <sub>12</sub> - Lift th progr. PO <sub>7</sub>	t and susta e-long Lea am outco PO <sub>8</sub>	ainability, I rning mes	<b>РО</b> 8- Е				
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub>	o- Commun	ication, <b>PO</b> <sub>2</sub> 1 3 2	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3	ect manag ng of cou PO4 2 2	PO5	7, <b>PO</b> 7- Ēn <sup>.</sup> d finance, comes wi	vironmen , PO <sub>12</sub> - Lift th progr. PO <sub>7</sub>	t and susta e-long Lea am outco PO <sub>8</sub>	ainability, I rning mes	<b>РО</b> 8- Е				
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	PO1 1 	<b>PO</b> <sub>2</sub> 1 3 2 2	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - J	PO4 PO4 2 2 Reasonal	PO <sub>5</sub> PO <sub>5</sub> 2 ble; 2 - S	r, <b>PO</b> 7- Én d finance, comes wi <b>PO</b> 6 ignifican	vironmen PO <sub>12</sub> - Life th progra PO <sub>7</sub> t; 3 – Str	t and susta e-long Lea am outco PO <sub>8</sub>	ninability, i rning mes PO <sub>9</sub>	POs- E PO				
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments	PO1 1 	<b>PO</b> <sub>2</sub> 1 3 2 2	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - J	PO4 PO4 2 2 Reasonal	PO <sub>5</sub> PO <sub>5</sub> 2 ble; 2 - S	r, <b>PO</b> 7- Én d finance, comes wi <b>PO</b> 6 ignifican	vironmen PO <sub>12</sub> - Life th progra PO <sub>7</sub> t; 3 – Str	t and susta e-long Lea am outco PO <sub>8</sub>	ninability, i rning mes PO <sub>9</sub>	POs- E PO				
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	PO1 1 	<b>PO</b> <sub>2</sub> 1 3 2 2	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - J	PO4 PO4 2 2 Reasonal	PO <sub>5</sub> PO <sub>5</sub> 2 ble; 2 - S	r, <b>PO</b> 7- Én d finance, comes wi <b>PO</b> 6 ignifican	vironmen PO <sub>12</sub> - Life th progra PO <sub>7</sub> t; 3 – Str	t and susta e-long Lea am outco PO <sub>8</sub>	ninability, i rning mes PO <sub>9</sub>	POs- E PO				
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments	PO1 1 	<b>PO</b> <sub>2</sub> 1 3 2 2	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - J	PO4 PO4 2 2 Reasonal	PO <sub>5</sub> PO <sub>5</sub> 2 ble; 2 - S	r, <b>PO</b> 7- Én d finance, comes wi <b>PO</b> 6 ignifican	vironmen PO <sub>12</sub> - Life th progra PO <sub>7</sub> t; 3 – Str	t and susta e-long Lea am outco PO <sub>8</sub>	ninability, i rning mes PO <sub>9</sub>	POs- E PO				
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments 1.	PO1 1 its: s are based	PO2 1 3 2 2 d on the	0 <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - 1 syllabus	PO4 PO4 2 2 Reasonal	PO5 PO5 2 ble; 2 - S bed for 1	r, PO <sub>7</sub> - Én d finance, comes wi PO <sub>6</sub> ignifican	vironmen , PO <sub>12</sub> - Lift th progra PO <sub>7</sub> t; 3 – Str	t and susta e-long Lea am outco PO <sub>8</sub> cong	ninability, i rning mes PO <sub>9</sub> sing pytl	POs- E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments 1. Examination an	PO1 1 ts: s are based	PO2 1 3 2 2 d on the ion Patt	0 <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - 1 syllabus ern: It i	PO4 PO4 2 2 Reasonal s prescri	PO5 PO5 2 ble; 2 - S bed for 1	r, <b>PO</b> <sub>7</sub> - Én d finance, comes wi <b>PO</b> <sub>6</sub> ignifican Deep lear	vironmen , PO <sub>12</sub> - Life th progr. PO <sub>7</sub> , PO <sub>7</sub> , rning alg	t and susta e-long Lea am outco PO <sub>8</sub> cong gorithm u	PO <sub>9</sub> s) comprise	POs- E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments 1. Examination an exams/ assignm	PO1 1 ts: s are based	PO2 1 3 2 2 d on the ion Patt	0 <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - 1 syllabus ern: It i	PO4 PO4 2 2 Reasonal s prescri	PO5 PO5 2 ble; 2 - S bed for 1	r, <b>PO</b> <sub>7</sub> - Én d finance, comes wi <b>PO</b> <sub>6</sub> ignifican Deep lear	vironmen , PO <sub>12</sub> - Life th progr. PO <sub>7</sub> , PO <sub>7</sub> , rning alg	t and susta e-long Lea am outco PO <sub>8</sub> cong gorithm u	PO <sub>9</sub> s) comprise	POs- E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments 1. Examination an exams/ assignm examination.	PO1 1 ts: s are based	PO2 1 3 2 2 d on the ion Patt	0 <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - 1 syllabus ern: It i	PO4 PO4 2 2 Reasonal s prescri	PO5 PO5 2 ble; 2 - S bed for 1	r, <b>PO</b> <sub>7</sub> - Én d finance, comes wi <b>PO</b> <sub>6</sub> ignifican Deep lear	vironmen , PO <sub>12</sub> - Life th progr. PO <sub>7</sub> , PO <sub>7</sub> , rning alg	t and susta e-long Lea am outco PO <sub>8</sub> cong gorithm u	PO <sub>9</sub> s) comprise	POs- E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	
or team work, PO <sub>10</sub> Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments 1. Examination an exams/ assignm examination.	PO1 1 1 ts: s are based d Evaluat ents/ quiz	PO2 1 3 2 2 d on the ion Patt	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - 1 syllabus	PO4 PO4 2 2 Reasonal s prescri	PO5 PO5 2 ble; 2 - S bed for 1 poth inte	r, <b>PO</b> <sub>7</sub> - Én d finance, comes wi <b>PO</b> <sub>6</sub> ignifican Deep lear	vironmen , PO <sub>12</sub> - Life th progr. PO <sub>7</sub> , PO <sub>7</sub> , rning alg	t and susta e-long Lea am outco PO <sub>8</sub> cong gorithm u	PO <sub>9</sub> s) comprise	POs- E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments 1. Examination an exams/ assignm examination. Text Books:	PO1 PO1 PO1 sts: s are based d Evaluat ents/ quiz python for	PO2 1 3 2 2 d on the ion Patt z/ semir	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - 1 syllabus ern: It i har prese	PO4 PO4 2 2 Reasonal s prescri	PO5 PO5 2 bed for 1 both interest. and	r, <b>PO</b> <sub>7</sub> - Én d finance, comes wi <b>PO</b> <sub>6</sub> ignifican Deep lear	vironmen , PO <sub>12</sub> - Life th progr. PO <sub>7</sub> , PO <sub>7</sub> , rning alg	t and susta e-long Lea am outco PO <sub>8</sub> cong gorithm u	PO <sub>9</sub> s) comprise	POs- E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	
Course         Outcomes         CO1         CO2         CO3         CO4    Detailed Conten Lab experiments 1. Examination an exams/ assignm examination. Text Books: 1 Mastering	PO1 PO1 1 ts: s are based d Evaluat ents/ quiz	PO2 1 3 2 d on the ion Patt z/ semir r data sei r algebra	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - 1 syllabus eern: It i har prese	ret manag ng of cou PO4 2 2 2 Reasonal s prescri entation mir Mad bert Stra	PO5 PO5 2 ble; 2 - S bed for 1 both interest. and havan	r, <b>PO</b> 7- Én d finance, comes wi <b>PO</b> 6 ignifican Deep lean ernal eva external	vironmen , PO <sub>12</sub> - Lift th progr. PO <sub>7</sub> t; 3 – Str rning alg lluation ( evaluation	t and susta e-long Lea am outco PO <sub>8</sub> cong gorithm u	PO <sub>9</sub> s) comprise	POs- E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments 1. Examination an exams/ assignm examination. Text Books: 1 Mastering 2 Introducti 3 Machine L Reference Books	PO1 PO1 1 ts: s are based d Evaluat ents/ quiz python for on to linea earning us s:	PO2 1 3 2 2 d on the ion Patt z/ semir r data sci r algebra ing Pyth	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - 1 syllabus ern: It i har prese ience, Sa a - by Gil on, U Dir	ret manag ng of cou PO4 2 2 Reasonal s prescri	PO5 PO5 2 ble; 2 - S bed for 1 both interest. and havan ng nar Mana	r, PO <sub>7</sub> - En d finance, comes wi PO <sub>6</sub> ignifican Deep lean ernal eva external ranjan Pr	vironmen PO <sub>12</sub> - Lift th progr PO <sub>7</sub> rning alg lluation ( evaluation evaluation	t and susta e-long Lea am outco PO <sub>8</sub> cong gorithm u (50 marks on (50 ma	PO <sub>9</sub> s) comprise	POs- E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Lab experiments 1. Examination an exams/ assignm examination. Text Books: 1 Mastering 2 Introducti 3 Machine L	PO1 PO1 1 ts: s are based d Evaluat ents/ quiz python for on to linea earning us s:	PO2 1 3 2 2 d on the ion Patt z/ semir r data sci r algebra ing Pyth	O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2 3 3 1 - 1 syllabus ern: It i har prese ience, Sa a - by Gil on, U Dir	ret manag ng of cou PO4 2 2 Reasonal s prescri	PO5 PO5 2 ble; 2 - S bed for 1 both interest. and havan ng nar Mana	r, PO <sub>7</sub> - En d finance, comes wi PO <sub>6</sub> ignifican Deep lean ernal eva external ranjan Pr	vironmen PO <sub>12</sub> - Lift th progr PO <sub>7</sub> rning alg lluation ( evaluation evaluation	t and susta e-long Lea am outco PO <sub>8</sub> cong gorithm u (50 marks on (50 ma	PO <sub>9</sub> s) comprise	POs- E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	

Course Cod			Course TitleLectureInternet of ThingsLT									~	Semester: IV	
MTCS411PC	Γľ		<b>D</b> - 4			0	11 0000		L	T	P	Sei	nester: IV	
Version: 1.2	Cal and a	- £ T 4		of Appr	oval: 16t	h BoS 17-	11-2022	Calerra	4 • <b>f F</b> ====	0	0			
No. of	Scheme Periods	1							of Exami				100	
	/ Week	: 60 I : 4	HIS.						Maximun				30	
Perious	Credits	: 4				Internal Evaluation:30End Semester:70								
Instructio		• -	ture						Exam D			•	3 Hrs.	
Prerequisite(s): C										urac		·	5 111 5.	
Course Objective		110011011	10											
1. Vision and Int		n to IOT												
2. Understand I	oT Marke	t perspe	ctive.											
3. Data and Kno	wledge N	lanagem	ent and	use of D	evices in	IoT Tec	hnology.							
4. Understand S	tate of Ar	t-IoT Ar	chitectu	ire and it	ts impler	nentatio	n.							
Course Outcome	s (CO):													
COs No.					Stateme	ent							Program	
<b>CO</b> <sub>1</sub> Explain & demonstrate various components of IoT along with Issues and											Ou		es (POs)	
CO <sub>1</sub>	Explain & Challeng			various	compon	ents of	IoT alon	g with Is	ssues an	d		PO <sub>2</sub>	PO <sub>4</sub>	
CO <sub>2</sub>				e and im	portance	e of IoT i	n the mod	dern worl	d.		Р	O1. P	O <sub>2</sub> , PO <sub>5</sub>	
		2						T for re		d			O <sub>3</sub> , PO <sub>5</sub>	
	applicatio		r - F - 500			1					-	, -	-,0	
			y of exist	ting and	develop	ing archi	tecture te	echnologi	es for Io'	Г	Р	<b>O</b> 1, <b>P</b>	<b>D</b> <sub>2</sub> , <b>PO</b> <sub>3</sub> ,	
	and to de	escribe a	nd evalu	ate diffe	rent app	lications	of the Io'	T.				PO <sub>4</sub>	<b>PO</b> <sub>12</sub>	
PO <sub>1</sub> - Engineering K														
problems, <b>PO</b> <sub>5</sub> - Mo										PO <sub>8</sub> -	Ethic	s, <b>PO</b>	- Individua	
or team work, <b>PO</b> 10-	Commun	ication. P	$\mathbf{U}_{11}$ - Proje	ct manag	ement an			-long Lear	ning					
Course			Mappir	ng of cou			th progra	m outcor	nes	1				
Course Outcomes	PO <sub>1</sub>	PO <sub>2</sub>								PC	O <sub>10</sub>	РО	11 PO <sub>12</sub>	
Outcomes			Mappir	ng of cou	irse outo	comes wi	th progra	m outcor	nes	PO	<b>D</b> <sub>10</sub>	РО	11 PO <sub>12</sub>	
		PO <sub>2</sub>	Mappir	ng of cou PO4	irse outo	comes wi	th progra	m outcor	nes	PO	D <sub>10</sub>	PO	11 PO <sub>12</sub>	
Outcomes CO <sub>1</sub>	PO <sub>1</sub>	PO <sub>2</sub>	Mappir	ng of cou PO4	rse outc PO₅	comes wi	th progra	m outcor	nes	P	D <sub>10</sub>	PO	11 PO <sub>12</sub>	
Outcomes CO <sub>1</sub> CO <sub>2</sub>	PO <sub>1</sub>	PO <sub>2</sub> 2 2	Mappir PO <sub>3</sub>	ng of cou PO4	PO <sub>5</sub>	comes wi	th progra	m outcor	nes	PO	D <sub>10</sub>	PO	PO <sub>12</sub>	
OutcomesCO1CO2CO3	PO <sub>1</sub>	PO <sub>2</sub> 2 2 2	Mappin PO <sub>3</sub> 2 3	ng of cou PO4 2 2	PO <sub>5</sub>	PO <sub>6</sub>	th progra	PO <sub>8</sub>	nes	P	D <sub>10</sub>	PO		
Outcomes           CO1           CO2           CO3           CO4	PO <sub>1</sub> 2 3	PO <sub>2</sub> 2 2 2	Mappin PO <sub>3</sub> 2 3	ng of cou PO4 2 2	PO <sub>5</sub>	PO <sub>6</sub>	th progra PO <sub>7</sub>	PO <sub>8</sub>	nes	P	D <sub>10</sub>	PO		
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content	PO <sub>1</sub> 2 3	PO <sub>2</sub> 2 2 2 2	Mappin PO <sub>3</sub> 2 3 1 - 1	PO4 PO4 2 2 Reasonal	PO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>6</sub>	th progra PO <sub>7</sub> t; 3 – Stro	PO <sub>8</sub>	PO <sub>9</sub>					
Outcomes           CO1           CO2           CO3           CO4	PO <sub>1</sub> 2 3	PO <sub>2</sub> 2 2 2 2 Introdu Networ	Mappin PO <sub>3</sub> 2 3 1 - 1 uction to rking Co	ng of cou PO4 2 2 Reasonal 0 IoT, IO' mmunic	PO <sub>5</sub> 2 2 ble; 2 - Station Profile	PO6 PO6 ignifican tecture, S	th progra PO <sub>7</sub> t; 3 – Stro Sensing, <i>F</i>	PO <sub>8</sub>	PO9 PO9	of N	letwo	orkin	g, Basics c	
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1	PO <sub>1</sub> 2 3	PO <sub>2</sub> 2 2 2 2 Introdu Networ Comm	Mappin PO <sub>3</sub> 2 3 1 - 1 uction to rking Co unication	PO4 PO4 2 2 Reasonal 0 IoT, IO' mmunic n Protoc	PO5 2 2 ble; 2 – Sa T Architation Pro cols, Sen	PO6 PO6 ignifican tecture, S otocols.	th progra PO <sub>7</sub> t; 3 – Stro Sensing, <i>F</i>	PO <sub>8</sub>	PO9 PO9	of N	letwo	orkin	2	
Outcomes         CO1         CO2         CO3         CO4	PO <sub>1</sub> 2 3	PO <sub>2</sub> 2 2 2 2 Introdu Networ Commu	Mappin PO <sub>3</sub> 2 3 1 - 1 uction to rking Co unication uction to	PO4 PO4 2 2 Reasonal 0 IoT, IO <sup>7</sup> mmunic n Protoc	PO5 PO5 2 2 ble; 2 – Sa T Architation Pro cols, Sen DN for Io	PO6 PO6 ignifican tecture, S otocols. asor Network	th progra PO <sub>7</sub> t; 3 – Stro Sensing, A works, M	PO <sub>8</sub>	PO9 PO9 , Basics o	of N	letwo	orking	g, Basics c	
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1	PO <sub>1</sub> 2 3	PO <sub>2</sub> 2 2 2 2 Introdu Networ Commu Introdu Issues	Mappin PO <sub>3</sub> 2 3 1 – 1 Inction to rking Co unication Inction to and Cha	PO4 PO4 2 Reasonal D IoT, IO' mmunic n Protoo SDN, SI Illenges i	PO5 2 2 ble; 2 – Si T Archit ation Pro cols, Sen DN for Io n IoT, In	PO6 PO6 ignifican tecture, S otocols. isor Networ teropera	th progra PO <sub>7</sub> t; <b>3 – Stro</b> Sensing, <i>I</i> works, M bility in Io	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to	PO9 PO9 , Basics o D-Machin	of N ne C	letwo	orkin nunic o Pro	g, Basics c ations and gramming	
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1	PO <sub>1</sub> 2 3	PO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Mappin PO <sub>3</sub> 2 3 1 - 1 action to rking Co unication iction to and Chai velopme	PO4 PO4 2 2 Reasonal 0 IoT, IO mmunic n Protoc 0 SDN, SI Ilenges i ent tools	PO5 PO5 2 2 ble; 2 – Si ble; 2 – Si ble; 2 – Si cols, Sen DN for Io n IoT, In s/platfor	PO <sub>6</sub> PO <sub>6</sub> ignifican tecture, S otocols. isor Network teropera rms, Inte	th progra PO <sub>7</sub> t; 3 – Stra Sensing, <i>I</i> works, M bility in Ia	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to	PO9 PO9 , Basics o D-Machin	of N ne C	letwo	orkin nunic o Pro	g, Basics c	
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1 Unit: 2	PO <sub>1</sub> 2 3	PO2 2 2 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Mappin PO <sub>3</sub> 2 3 1 - 1 Inction to rking Co unication inction to and Chai velopme inction to	PO4 PO4 2 2 Reasonal 0 IoT, IO mmunic n Protoco 2 SDN, SI llenges i ent tools 0 Raspbe	PO5 PO5 2 2 ble; 2 – Station Pro- cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im	PO6 PO6 ignifican tecture, S otocols. isor Networ teropera	th progra PO <sub>7</sub> t; 3 – Stra Sensing, <i>I</i> works, M bility in Ia	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to	PO9 PO9 , Basics o D-Machin	of N ne C	letwo	orkin nunic o Pro	g, Basics c ations and gramming	
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1 Unit: 2	PO <sub>1</sub> 2 3	PO2 2 2 2 2 Introdu Networ Introdu Introdu Introdu Introdu Introdu of IoT v	Mappin PO <sub>3</sub> 2 3 1 - 1 Inction to rking Co unication inction to and Chal velopme inction to with Ras	PO4 PO4 2 2 Reasonal 0 IoT, IO mmunic n Protoc 9 SDN, SI Ilenges i ent tools 9 Raspbe: pberry P	PO <sub>5</sub> PO <sub>5</sub> 2 2 ble; 2 – Station Pro- cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im i.	PO6 PO6 ignifican tecture, S otocols. isor Network teropera rms, Inten plement	th progra PO <sub>7</sub> t; 3 – Stra Sensing, A works, M bility in Id egration ation	PO <sub>8</sub> PO <sub>8</sub> ong Actuation fachine-to of Sensor	PO9 PO9 , Basics o D-Machin luction to rs and A	f N ae C	letwo	orking nunic o Pro	g, Basics c ations and gramming n Arduinc	
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1 Unit: 2	PO <sub>1</sub> 2 3	PO <sub>2</sub> 2 2 2 2 Introdu Networ Commu Introdu Issues IoT de Introdu of IoT y IoT bas	Mappin PO <sub>3</sub> 2 3 1 - 1 uction to rking Co unication uction to and Chai velopme uction to with Ras sed Cloud	PO4 PO4 2 2 Reasonal 0 IoT, IO' mmunic 0 IoT, IO' mmunic 0 SDN, SI llenges i ent tools 0 Raspber pberry P d Compu	PO5 PO5 2 2 DIe; 2 – Si DIe; 2 – Si DIe; 2 – Si Cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im i. uting, Sen	PO6 PO6 ignifican tecture, S otocols. isor Network teropera rms, Inten plement	th progra PO <sub>7</sub> t; 3 – Stra Sensing, A works, M bility in Id egration ation	PO <sub>8</sub> PO <sub>8</sub> ong Actuation fachine-to of Sensor	PO9 PO9 , Basics o D-Machin luction to rs and A	f N ae C	letwo	orking nunic o Pro	g, Basics c ations and gramming	
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4	PO <sub>1</sub> 2 3	PO2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Mappin PO <sub>3</sub> 2 3 1 - 1 uction to rking Co unication uction to and Chai velopme uction to with Ras sed Cloue andling a	PO4 PO4 2 2 Reasonal 0 IoT, IO' mmunic n Protoc 0 SDN, SI llenges i ent tools 0 Raspber pberry P d Compu	PO5 PO5 2 2 ble; 2 – Si F Architation Pro cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im i. uting, Sen ytics.	PO6 PO6 ignifican tecture, S otocols. isor Networ teropera ms, Inter plement	th progra PO <sub>7</sub> t; 3 – Stro Sensing, A works, M bility in Io egration ation ud, Fog C	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to of Sensor	PO9 PO9 , Basics of D-Machin luction to rs and A g, Smart of	f N ae C o Aro Citie	lietwo omm duino ators	orkin <sub>i</sub> nunic o Pro + witl d Sma	g, Basics c ations and gramming n Arduinc	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3	PO <sub>1</sub> 2 3	PO <sub>2</sub> 2 2 2 2 Introdu Networ Commu Introdu Issues a IoT de Introdu of IoT v IoT bas Data H IoT Bas	Mappin PO <sub>3</sub> 2 3 1 - 1 action to rking Co unication unication iction to and Chal velopme iction to with Ras sed Cloud andling a sed Con	PO4 PO4 2 2 Reasonal 0 IoT, IO mmunic n Protoc 0 SDN, SI Ilenges i ent tools 0 Raspbei pberry P d Compu and Anal nected V	PO5 PO5 2 2 DIE; 2 – Si DIE; 2 – Si DIE; 2 – Si Cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im i. uting, Sen ytics. /ehicles,	ecomes wi PO <sub>6</sub> ignifican tecture, S otocols. isor Network teropera ms, Inter plement nsor-Clo Smart G	th progra PO <sub>7</sub> t; 3 – Stra Sensing, A works, M bility in Id egration ud, Fog C rid, Indus	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to oT, Introc of Sensor	PO <sub>9</sub> PO <sub>9</sub> , Basics o o-Machin duction to rs and A g, Smart o Applicat	f N ne C o Aro Citie	letwo omm duino ators es ano	orkin; nunic o Pro + witl d Sma	g, Basics c ations and gramming n Arduinc	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5	PO <sub>1</sub> 2 3 s:	PO2 2 2 2 2 Introdu Networ Commu Introdu Issues 3 IoT de Introdu of IoT v IoT bas Data H IoT Bas Agricul	Mappin PO <sub>3</sub> 2 3 1 - 1 action to rking Co unication unication and Chal velopme and Chal velopme and Chal sed Cloue andling a sed Con ture, He	PO4 PO4 2 2 Reasonal 0 IoT, IO mmunic n Protoc 0 SDN, SI Ilenges i ent tools 0 Raspber pberry P d Compu and Anal nected V althcare	PO5 PO5 2 2 ble; 2 – Si ation Pro cols, Sen DN for Io n IoT, In s/platfor rry Pi, In vi. uting, Sen ytics. /ehicles, , Activity	PO6 PO6 ignifican tecture, S otocols. Isor Network teropera ms, Inten plement nsor-Clo Smart G 7 Monitor	th progra PO <sub>7</sub> t; 3 – Stre Sensing, <i>A</i> Sensing, <i>A</i> works, M bility in Id egration ation ud, Fog C rid, Indus	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to oT, Introc of Sensor Computing strial IoT. ementatio	PO9 PO9 , Basics o o-Machin luction to rs and A g, Smart o Applicat	f N e C o Ard Citie	letwo omm duino ators es ano s of I	orkin; nunic o Pro + witl d Sma oT, C s.	g, Basics c ations and gramming n Arduinc art Homes	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and	PO <sub>1</sub> 2 3 s:	PO <sub>2</sub> 2 2 2 2 Introdu Networ Commu Introdu Issues a IoT de Introdu of IoT v IoT bas Data H IoT Bas Agricul <b>con Patt</b>	Mappin PO <sub>3</sub> 2 3 1 - 1 iction to rking Co unication iction to and Chal velopme iction to with Ras sed Cloud andling a sed Con iture, He ern: It i	PO4 PO4 2 2 Reasonal 0 IoT, IO' mmunic 0 IoT, IO' mmunic 0 SDN, SI llenges i ent tools 0 SDN, SI llenges i ent tools 0 Raspbe: pberry P d Compu and Anal nected V althcare nclude b	PO5 PO5 2 2 ble; 2 – Si ble; 2 – Si cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im ti. uting, Sen ytics. /ehicles, , Activity	PO6 PO6 ignifican tecture, S otocols. isor Network teropera ms, Inter plement nsor-Clo Smart G 7 Monitor ernal eva	th progra PO7 t; 3 – Stra Sensing, A Sensing, A works, M bility in Id egration ation ud, Fog C rid, Indus ing, Impl luation (3	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to oT, Introc of Sensor Computing strial IoT. ementatio 30 marks	PO9 PO9 , Basics o D-Machin luction to rs and A g, Smart o Applicat on of IoT ) comprise	f N e C o Are Citie	letwo omm duind ators s of I s of I two	orking nunic o Pro b witl d Sm. oT, C s. clas	g, Basics c ations and gramming n Arduinc art Homes ase Study s sessiona	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment	PO <sub>1</sub> 2 3 s:	PO <sub>2</sub> 2 2 2 2 Introdu Networ Commu Introdu Issues a IoT de Introdu of IoT v IoT bas Data H IoT Bas Agricul <b>con Patt</b>	Mappin PO <sub>3</sub> 2 3 1 - 1 iction to rking Co unication iction to and Chal velopme iction to with Ras sed Cloud andling a sed Con iture, He ern: It i	PO4 PO4 2 2 Reasonal 0 IoT, IO' mmunic 0 IoT, IO' mmunic 0 SDN, SI Illenges i ent tools 0 SDN, SI Illenges i ent tools 0 Raspbe: pberry P d Compu and Anal nected V althcare nclude b	PO5 PO5 2 2 ble; 2 – Si ble; 2 – Si cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im ti. uting, Sen ytics. /ehicles, , Activity	PO6 PO6 ignifican tecture, S otocols. isor Network teropera ms, Inter plement nsor-Clo Smart G 7 Monitor ernal eva	th progra PO7 t; 3 – Stra Sensing, A Sensing, A works, M bility in Id egration ation ud, Fog C rid, Indus ing, Impl luation (3	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to oT, Introc of Sensor Computing strial IoT. ementatio 30 marks	PO9 PO9 , Basics o D-Machin luction to rs and A g, Smart o Applicat on of IoT ) comprise	f N e C o Are Citie	letwo omm duind ators s of I s of I two	orking nunic o Pro b witl d Sm. oT, C s. clas	g, Basics c ations and gramming n Arduinc art Homes ase Study s sessiona	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignme examination. Text Books:	PO1 2 3 s: Evaluationts/quiz	PO <sub>2</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Mappin PO <sub>3</sub> 2 3 1 - 1 iction to rking Co unication iction to and Chai velopme iction to with Ras sed Cloud andling a sed Conn iture, He ern: It i har prese	PO4 PO4 2 2 Reasonal 0 IoT, IO mmunic 0 IoT, IO mmunic 0 SDN, SI llenges i ent tools 0 Raspber pberry P d Compu and Anal nected V althcare nclude b	PO5 PO5 2 2 DIe; 2 – Si DIe; 2	PO6 PO6 ignifican tecture, S otocols. isor Networ teropera ms, Inter plement nsor-Clo Smart G / Monitor ernal eva external	th progra PO7 t; 3 – Stra Sensing, A works, M bility in Ia gration ud, Fog C rid, Indus ing, Impl luation (3 evaluatio	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to of, Introc of Sensor Computing strial IoT. ementatio 30 marks n (70 mar	PO9 PO9 , Basics o o-Machin luction to rs and A g, Smart 0 . Applicat on of IoT ) comprise ks) which	f N ne C o Arca con con sing n is 1	letwo omm duino ators es ano s of I two main	orking nunic o Pro d Sma oT, C s. class ly end	g, Basics c ations and gramming n Arduinc art Homes ase Study s sessiona	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment examination.	PO1 2 3 s: Evaluationts/quiz	PO <sub>2</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Mappin PO <sub>3</sub> 2 3 1 - 1 iction to rking Co unication iction to and Chai velopme iction to with Ras sed Cloud andling a sed Conn iture, He ern: It i har prese	PO4 PO4 2 2 Reasonal 0 IoT, IO mmunic 0 IoT, IO mmunic 0 SDN, SI llenges i ent tools 0 Raspber pberry P d Compu and Anal nected V althcare nclude b	PO5 PO5 2 2 DIe; 2 – Si DIe; 2	PO6 PO6 ignifican tecture, S otocols. isor Networ teropera ms, Inter plement nsor-Clo Smart G / Monitor ernal eva external	th progra PO7 t; 3 – Stra Sensing, A works, M bility in Ia gration ud, Fog C rid, Indus ing, Impl luation (3 evaluatio	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to of, Introc of Sensor Computing strial IoT. ementatio 30 marks n (70 mar	PO9 PO9 , Basics o o-Machin luction to rs and A g, Smart 0 . Applicat on of IoT ) comprise ks) which	f N ne C o Arca con con sing n is 1	letwo omm duino ators es ano s of I two main	orking nunic o Pro d Sma oT, C s. class ly end	g, Basics c ations an gramming n Arduinc art Homes ase Study s sessiona	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment examination. Text Books: 1 Internet of 2 The Internet	PO <sub>1</sub> 2 3 s: LEvaluati nts/ quiz Things: A et of Thin	PO <sub>2</sub> 2 2 2 2 2 Introdu Netwoi Commu Introdu I	Mappin PO <sub>3</sub> 2 3 1 – 1 inction to rking Co unication inction to and Chai velopme inction to with Ras sed Cloue andling a sed Com ture, He ern: It in ar prese	PO4 PO4 2 2 Reasonal 0 IOT, IO' mmunic 1 Protoc 0 SDN, SI llenges i ent tools 0 Raspber pberry P d Compu and Anal nected V althcare nclude t	PO5 PO5 2 2 DIe; 2 – Si DIe; 2 – Si Cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im i. uting, Sen ytics. /ehicles, , Activity Doth interest etc. and	PO6 PO6 ignifican tecture, S otocols. isor Networ ot teropera ms, Inter insor-Clo Smart G v Monitor ernal eva external ep Bahga	th progra PO7 t; 3 – Stro Sensing, A works, M bility in Id gration ud, Fog C rid, Indus ing, Impl luation (3 evaluatio and Vijay	PO <sub>8</sub> PO <sub>8</sub> PO <sub>8</sub> Actuation achine-to of Sensor Computing strial IoT. ementatio 30 marks n (70 mar	PO9 PO9 , Basics o o-Machin duction te rs and A g, Smart 0 Applicat on of IoT ) comprise ks) which	f N ae C citie cions con sing n is 1	letwo omm duind ators es and s of I two main es Pro	orkin <sub>i</sub> nunic o Pro o Pro d Sma class ly end ess).	g, Basics c ations an gramming n Arduinc art Homes ase Study s sessiona d semeste	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 2 Unit: 3 Unit: 5 Examination and exams/ assignme examination. Text Books: 1 Internet of 2 The Internet (CRC Press)	PO <sub>1</sub> 2 3 s: HEvaluati	PO <sub>2</sub> 2 2 2 2 2 Introdu Netwoi Commu Introdu I	Mappin PO <sub>3</sub> 2 3 1 – 1 inction to rking Co unication inction to and Chai velopme inction to with Ras sed Cloue andling a sed Com ture, He ern: It in ar prese	PO4 PO4 2 2 Reasonal 0 IOT, IO' mmunic 1 Protoc 0 SDN, SI llenges i ent tools 0 Raspber pberry P d Compu and Anal nected V althcare nclude t	PO5 PO5 2 2 DIe; 2 – Si DIe; 2 – Si Cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im i. uting, Sen ytics. /ehicles, , Activity Doth interest etc. and	PO6 PO6 ignifican tecture, S otocols. isor Networ ot teropera ms, Inter plement msor-Clo Smart G 7 Monitor ernal eva external ep Bahga	th progra PO7 t; 3 – Stro Sensing, A works, M bility in Id gration ud, Fog C rid, Indus ing, Impl luation (3 evaluatio and Vijay	PO <sub>8</sub> PO <sub>8</sub> PO <sub>8</sub> Actuation achine-to of Sensor Computing strial IoT. ementatio 30 marks n (70 mar	PO9 PO9 , Basics o o-Machin duction te rs and A g, Smart 0 Applicat on of IoT ) comprise ks) which	f N ae C citie cions con sing n is 1	letwo omm duind ators es and s of I two main es Pro	orkin <sub>i</sub> nunic o Pro o Pro d Sma class ly end ess).	g, Basics c ations and gramming n Arduinc art Homes ase Study s sessiona d semeste	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 2 Unit: 3 Unit: 3 Unit: 5 Examination and exams/ assignme examination. Text Books: 1 Internet of 2 The Internet (CRC Press) Reference Books:	PO <sub>1</sub> 2 3 s: Evaluati ents/ quiz Things: A et of Thin .	PO <sub>2</sub> 2 2 2 2 2 Introdu Networ Commu Introdu Issues 3 IoT de Introdu of IoT v IoT bas Data H IoT bas Data H IoT Bas Agricul <b>ion Patt</b> z/ semin Hands gs: Enab	Mappin PO <sub>3</sub> 2 3 1 - 1 Inction to rking Co unication inction to and Chal velopme inction to with Ras ised Cloud andling a sed Cloud andling a sed Con iture, He ern: It in har prese	PO4 PO4 2 Reasonal D IOT, IO' mmunic D IOT, IO' mmunic D IOT, IO' mmunic D SDN, SI llenges i ent tools D SDN, SI llenges i ent tools D Raspber pberry P d Compu and Anal nected V althcare nclude b entation of D SDN, SI	PO5 PO5 2 2 Dele; 2 – Si Architation Proc cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im ti. uting, Sen ytics. /ehicles, , Activity both integet. and ytics. /ehicles, platfor rry Pi, Im ti. uting, Sen ytics. /ehicles, platfor rry Pi, Im ti. vehicles, platfor rry Pi, Im ti. vehicles, platfor vehicles, platfor rry Pi, Im ti. vehicles, platfor vehicles,	PO6 PO6 ignifican tecture, S otocols. isor Network teropera ms, Inten plement nsor-Clo Smart G 7 Monitor ernal eva external ep Bahga	th progra PO7 Exposition of the second secon	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to oT, Introc of Sensor Computing strial IoT. ementation 30 marks n (70 mar y Madiset	PO <sub>9</sub> PO <sub>9</sub> , Basics o D-Machin duction te rs and A g, Smart o G, Smart o C, Applicat on of IoT ) compris ti (Univer thuru Raj	f N ne C citie con con sing n is r rsitie and	letwo omm duind ators es and s of I cept two main es Pro	orkin <sub>i</sub> nunic o Pro o Pro d Sma class ly end ess).	g, Basics c ations and gramming n Arduinc art Homes ase Study s sessiona d semeste	
Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 2 Unit: 3 Unit: 5 Examination and exams/ assignme examination. Text Books: 1 Internet of 2 The Internet (CRC Press)	PO1 2 3 s: Evaluati ents/quiz Things: A et of Thin b a Dastjerd	PO2 2 2 2 2 2 Introdu Networ Commu Introdu Issues 3 IoT de Introdu of IoT v IoT bas Data H IoT bas Data H IoT Bas Agricul ion Patt z/ semin Hands- gs: Enab	Mappin PO <sub>3</sub> 2 3 1 – 1 Inction too rking Co unication inction too and Chal welopmen inction too with Rass sed Cloud andling a sed Cloud and cloud action to and cloud action to action to	PO4 PO4 2 Reasonal D IOT, IO' mmunic n Protoc D SDN, SI llenges i ent tools D SDN, SI llenges i ent tools D Raspber pberry P d Computed and Anal nected V althcare nclude t entation D ach", by hnologie	PO5 PO5 2 2 ble; 2 – Si f Archit ation Pro cols, Sen DN for Io n IoT, In s/platfor rry Pi, Im ti. uting, Sen ytics. /ehicles, , Activity both inte etc. and / Arshdee	PO6 PO6 ignifican tecture, S otocols. isor Network teropera ms, Inter plement nsor-Clo Smart G / Monitor ernal eva external ep Bahga orms, and hings: Pr	th progra PO <sub>7</sub> t; 3 – Stra Sensing, A Sensing, A works, M bility in Id gration ud, Fog C rid, Indus ing, Impl luation (3 evaluatio and Vijay Use Case inciples a	PO <sub>8</sub> PO <sub>8</sub> ong Actuation achine-to oT, Introc oT, Intro oT, Introc oT, Intro oT, Intro oT, Introc oT, Introc oT, Introc	PO <sub>9</sub> PO <sub>9</sub> , Basics o D-Machin duction to rs and A g, Smart 0 G, Smart 0 C, Applicat on of IoT ) compris ti (Univer thuru Raj igms. Else	f N ne C o Artua Citie con sing n is r sitie and	letwo omm duind ators es and s of I cept two main es Pro Anu	orkin; nunic o Pro o Pro d Sma oT, C s. clas ly end ess). pama	g, Basics c ations an gramming n Arduinc art Homes ase Study s sessiona d semeste	

Course Co					Course T				Leo	ture		
MTCS460P	CP					ings Lab			L	Т Р	Sem	ester: II
Version: 1.2				of Appr	oval: 16tl	h BoS 17-1			0	0 4		
	Scheme	r - r						Scheme				
	Periods		Hrs.						Maximu		:	100
Periods	Week	: 4						Inte	ernal Eva		:	50
In atom at it	Credits	: 2	atian1							emester	:	50
Instruction Prerequisite(s): (			ictical						Exam L	uration		3 Hrs.
Course Objective		Networ	KS									
1. Understandin		the role	e of the (	Tloud in	ЮТ							
2. Understandir						Raspberry	v Pi.					
3. Understandir	0	1	1			r	,					
4. Create IoT ap	0		0	1								
Course Outcome	*											
COs No.				S	tatemer	nt				Мар	ped Pr	ogram
CO1         Understand core concept of IoT development.										Out	comes	(POs)
CO <sub>1</sub>											<b>PO</b> <sub>1</sub>	
CO2Understand the concept of Sensors, Actuators and Cloud.CO2Understand and create the data acquisition on cloud.											PO <sub>1</sub> , P	
	CO <sub>3</sub> Understand and create the data acquisition on cloud       CO <sub>4</sub> Create the IoT applications											PO <sub>4</sub>
CO4Create the IoT applicationsPO1- Engineering Knowledge, PO2- Problem analysis, PO3- Design/development of solutions, PO4- Cond											<b>D</b> <sub>3</sub> , <b>PO</b> <sub>4</sub>	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo												
or team work, <b>PO</b> <sub>10</sub>										FO8- Ethio	.5, FO9-	muiviuuai
,,		,				omes wit						
Course	DO	DO								во	DO	ЪО
Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	<b>PO</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>
CO <sub>1</sub>	1											
CO <sub>2</sub>	2	2										
CO <sub>3</sub>		2	2	2								
CO <sub>4</sub>			2	2	2							
			1 - 1	Reasonal	ole; 2 – Si	ignificant	;; 3 – Stro	ng				
Detailed Content		f Andrein	o and di	fforent t	mog of A	nduinaa						
<ol> <li>Study and Ins</li> <li>Write progra</li> </ol>						a dumos.						
3. Write Progra					•							
4. Study the Ter					am for n	nonitor te	mperatui	re using A	Arduino.			
5. Study and Im							1	0				
6. Study and im	plement l	MQTT pi	rotocol u	ising Ard	uino.							
7. Study and Co												
8. WAP for LED												
9. Study and Im								Claud				
<ol> <li>To understar</li> <li>To familiarize</li> </ol>									and over	r ThingSr	ool	
12. To upload DF									iiiei ove	r migst	JEak.	
13. To upload Lig												
14. To read Light	,	· · ·		<u> </u>		0	-		ugh Ras	oberry pi	2.	
Examination and												sessional
exams/assignme	ents/ quiz	z/ semin	ar prese	ntation o	etc. and	external e	evaluation	n (70 mar	ks) whic	h is main	ly end	semester
examination.												
Text Books:								-				
1 Bahga, A., 8									m1 ·			D 2 -
2 Veneri, G. Industrial		apasso,	A. (20	118). Han	as-on	Industria	ii Interi	net of	Things	: Create	e a	Powerful
Inductrial		. In decoder	u 10 Do	olzt Dubli	ching I +	d						
	IIPA LICIPO											
Infrastruct	-	gindustr	y 4.0. Pa			u.						
Infrastruct Reference Books							· Build on	the now	er of Blu	nk to cor	nfigure	smart
Infrastruct	e, P. (2018	3). Hands	-On Inte	ernet of '	Things w	rith Blynk	: Build on	the pow	er of Bly	nk to cor	nfigure	smart

Course Co	de				C	Course T	itle			L	ectu	re			
MTCS511P	СР		Sem	inar Pre	esentatio	on & Con	nprehens	sive viva-	voce	L	Т	Р	S	emes	ster: V
Version: 1.2				Date	of Appro	oval: 16tł	n BoS 17-	11-2022		0	0	4			
	Scheme	of I	nstru	ction					Scheme	of Exa	amin	ation			
No. o	f Periods	:	-							Maxin	num	Score	:	100	
Lab Hour	s/Week	:	-						In	ternal	Evalu	ation	:	30	
	Credits	:	2							Enc	l Sen	nester	:	70	
Instructi	on Mode	:	Pres	sentati	on					Exan	n Dui	ration	:	-	
Prerequisite(s):															
Course Objective	es:														
1.															
Course Outcome	es (CO):														
COs No.					ç	Stateme	nt					Мар	ped	Prog	gram
												Out	com	les (P	POs)
CO <sub>1</sub>									ds in rese					, <b>PO</b> 2	
$CO_2$									duct rese		ı		PO <sub>3</sub>	, <b>PO</b> 5	
									ssertatior						
PO <sub>1</sub> - Engineering I															
problems, <b>PO</b> <sub>5</sub> - Mo											у, <b>РО</b>	8- Ethic	s, <b>PC</b>	<b>)</b> 9- In	dividual
or team work, <b>PO</b> <sub>10</sub>	- Commun	icati							am outcoi						
Course		1		маррп	ig of cou		Unies wi	lii piogia		nes					
Outcomes	PO <sub>1</sub>	P	<b>O</b> 2	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	$PO_6$	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO	9	<b>PO</b> <sub>10</sub>	PO	O <sub>11</sub>	<b>PO</b> <sub>12</sub>
CO <sub>1</sub>	2		2												
	2		2	2		2					_				
					Deasonat	-	ianifican	t; 3 – Str	ona						
Detailed Conten	ts'				Cusonul	<i>n</i> c, 2 5	ignijicun	., 5 50	ong						
Detaneu conten	13.														
Based o	n research	ו nr	oblem	ו R&D											
Dubeu		- P-	001011	1102											
Examination an															
exams/ assignm	ents/ quiz	z/s	emina	ar prese	ntation	etc. and	external	evaluatio	on (70 mai	rks) wł	nich i	s main	ly er	nd se	mester
examination.															
Text Books:															
1															
Reference Books	5:														
1															

Course Co					Course Ti				L	ectu	re		
MTCS570F	СР			Disse	ertation-	- Part 1			L	Т	Р	Seme	ster: III
Version: 1.2			Date	of Appro	oval: 16th	BoS 17-	11-2022		0	0	20		
	Scheme	of In	struction					Scheme	e of Exa	amin	ation	•	
No. o	f Periods	:	20 Hrs.						Maxir	num	Score	: 70	0
Lab Hour	s/Week	:	20					In	ternal	Evalu	ation	: 210	)
	Credits	:	10						Enc	l Sen	nester	: 49	0
Instructi	on Mode	:	Practical						Exar	n Dui	ation	: -	
Prerequisite(s):													
Course Objective	es:												
2. To understa	nd the res	earcl	h issues & ch	allenges	s, researc	h goals,	scientifi	c method	s.				
3. To Review										rts a	nd Pr	oject Pr	oposals
Plagiarism aı	nd Copyrig	ghts.		-	Ũ		•		-			0	•
Course Outcome	s (CO):												
COs No.				S	Statemer	nt					Мар	ped Pro	gram
											Out	comes (	POs)
<b>CO</b> 1	Understa	and t	he issues & o	challeng	es, goals,	scientif	ic metho	ds in rese	earch.			PO <sub>1</sub> , PO <sub>2</sub>	2
CO <sub>2</sub>	Prepare	a pro	ject proposa	al (to uno	dertake a	project)	and con	duct rese	arch ir	1		PO <sub>3</sub> , PO <sub>3</sub>	i
			priate mann										
PO1- Engineering F													
problems, PO <sub>5</sub> - Mo										у, <b>РО</b>	8- Ethic	s, <b>PO</b> 9- I	ndividua
or team work, PO10	- Commun	icatio											
Course			маррп	ig of cou		omes wi	tn progra	am outco	mes				
Outcomes	PO <sub>1</sub>	PC	<b>PO</b> <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	$PO_6$	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO	9	<b>PO</b> <sub>10</sub>	<b>PO</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>
	2	2	,										
		_	2		2								
				Reasonat	ble; 2 – Si	anifican	t: 3 – Str	ona					
Detailed Conten	's'			Cousernat	<i>N</i> 0, 2 D1	gnijioun	., 0 50	ong					
<u>Detanea conten</u>													
Based or	n research	h pro	blem R&D										
Examination and													
exams/ assignm	, -	iz/ s	seminar pre	sentatio	on etc. a	nd exte	rnal eval	uation (4	190 m	arks)	which	is mai	nly enc
semester examin	ation.												
Text Books:													
1													
Reference Books	:												
1													

Course Co						course Ti				L	ectu	-		
MTCS670F	СР				Disse	rtation-	Part 2			L	Т	Р	Sei	nester: VI
Version: 1.2				Date of	of Appro	oval: 16th	BoS 17-1	11-2022		0	0	24		
	Scheme	of Ir	istruct	tion					Scheme	of Exa	mina	ation		
No. o	f Periods	:	40 Hr	rs.						Maxin	num S	Score	:	800
Lab Hour	s/ Week	:	40						Int	ernal	Evalu	ation	:	240
	Credits	:	12							End	l Sem	ester	:	560
Instructi	on Mode	:	Pract	tical						Exan	n Dur	ation	:	-
Prerequisite(s):														
Course Objective	es:													
•														
Course Outcome	s (CO):													
COs No.					S	Statemer	nt					Map	ped I	Program
												Out	come	es (POs)
CO <sub>1</sub>	To under	star	nd the r	researc	ch issues	s & challe	enges, re	esearch g	oals, scien	ntific			PO <sub>1</sub> , I	<b>PO</b> <sub>2</sub>
	methods						-	-						
CO <sub>2</sub>	To Review	w Li	teratur	re and	Researc	h Papers	; Writing	g Researc	h Papers,	Thesis	5,		<b>PO</b> <sub>3,</sub> 1	PO <sub>5</sub>
	Reports a	and	Project	t Propo	sals Plag	giarism a	ind Copy	rights.						
PO1- Engineering K														
problems, PO <sub>5</sub> - Mo											y, <b>PO</b> 8	- Ethic	s, <b>PO</b> 9	– Individual
or team work, PO10	- Communi	catio												
_			N	<i>Aappin</i>	g of cou	rse outc	omes wi	th progra	am outcon	nes				
Course	PO <sub>1</sub>	P	<b>O</b> <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO	,	<b>PO</b> 10	РО	11 <b>PO</b> 12
Outcomes		<b> </b>												
CO <sub>1</sub>	2		2											
CO <sub>2</sub>				2		2								
				1 – R	easonab	ole; 2 – Si	gnifican	t; 3 – Str	ong					
Detailed Conten	ts:													
• Based or	n research	ı pro	blem ]	R&D										

Examination and Evaluation Pattern: It include both internal evaluation (240 marks) comprising two class sessional exams/ assignments/ quiz/ seminar presentation etc. and external evaluation (560 marks) which is mainly end semester examination.

#### Text Books: 1

**Reference Books:** 1

Course Co	ode				Course '	Title			Leo	ture			
MTCS211F	PET				xpert Sy				L	T F	) S	leme	ster: II
Version: 1.2				e of App	<b>roval:</b> 161	th BoS 17-			4	0 0	)		
	Scheme	г т					9	Scheme o			-		
	f Periods		Hrs.						laximui			10	-
Period	s/Week	: 4						Inte	rnal Eva			30	
Instructi	Credits	: 4								emester		70	
Prerequisite(s)	on Mode		eture						Exam D	uration	1 :	3	Hrs.
Course Objecti		menge	ince										
1. To study th		ntelliger	nt agents	and sea	rch meth	nods.							
<ol> <li>To study th</li> <li>To study th</li> </ol>		0	0										
3. To construe		-		-									
4. To study th					8								
Course Outcon													
COs No.					Statem	ent				N	lappe	d Pr	ogram
													(POs)
CO <sub>1</sub>	and reas	oning te	chniques	5	•		g knowled				PC	<b>D</b> <sub>1</sub> , <b>P</b>	<b>O</b> <sub>2</sub>
CO <sub>2</sub>					s in di	fferent d	omains su	ich as r	nedicin	e,	PC	<b>)</b> <sub>2</sub> , <b>P</b>	O <sub>3</sub>
	engineer	0			1 - 1 - 1 0		11.11						
CO <sub>3</sub>		e			-		ilding expe	e e		1 -		<b>)</b> <sub>4</sub> , <b>P</b>	
CO <sub>4</sub>	Understa deploym	anding o	t the eth	nical and	l legal co	onsiderati	ons in the	developr	nent an	d	<b>PO</b> 4, I	P <b>O</b> 9,	<b>PO</b> <sub>10</sub>
<b>PO</b> <sub>1</sub> - Engineering problems, <b>PO</b> <sub>5</sub> - M or team work, <b>PO</b>	Aodern too	l usage, <b>P</b>	<b>0</b> 6- The 6 <b>PO</b> 11- Pro	engineer a ject mana	and societ gement a	ty, <b>PO</b> 7- Er nd finance	vironment a	and sustair long Learr	nability, I ling				
Course			· · ·									~	
Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	$PO_6$	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	Р	<b>O</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>
<b>CO</b> <sub>1</sub>	3	2											
CO <sub>2</sub>		2	2										
CO <sub>3</sub>				2	2					0			
CO <sub>4</sub>				2	-1.1	C::£:	4. 2 64		2	3			
Detailed Conte	nte		1-	- Reason	idie; 2 – 1	Signijicar	ıt; 3 – Stro	ng					
Detailed Colite	1115.	The m	eaning o	f an evne	ort system	n proble	m domain a	and know	ledge d	omain	the a	dvan	tages of
							the devel						
Unit: 1							tory and u						
		expert	systems	, proced	ural and	nonproc	edural para	adigms, c	haracte	ristics	of art	ificia	l neural
		system											
							en formal						
Unit: 2							esented, se tic nets, sc						
01111. 2							t knowledg						
			0			-	ons of prop	,	0				
							blem space						thods of
							of proposit						
Unit: 3							leduction,						
							forward an		ird chai	ning, a	lditio	nal r	nethods
							v decision devised to		, it two	or of or	rora	ottril	nutod to
							tion, featu						
<b>7 7 1</b>							nd conditi						
Unit: 4							ning, Mark						
		necess	ity, role	of uncer	tainty in	inference	e chains, in	nplication	s of cor				
							obabilities						
							ds of dea						
Unit: 5		theory	, theory	of unce	uncertainty based on fuzzy logic, commercial applications of fuzzy logic. Appropriate problem, the stages in the development of an expert system,								
0111010													

	types of errors to expect in the development stages, the role of the knowledge engineer in
	the building of expert systems, the expected life cycle of an expert system, how to do a life
	cycle model.
Exan	nination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class sessional
exan	ns/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
	nination.
Text	Books:
1	J. Giarratano and G. Riley, "Expert Systems Principles and Programming". 4th Edition, PWS Publishing
	Company, 2004.
2	
Refe	rence Books:
1	Durkin, J., Expert systems Design and Development, Macmillan, 1994 2. Elias M. Awad, Building Expert Systems,
	West Publishing Company 1996.
2	

Course Co					Course '				Le	ecture			
MTCS212P	ET				elligent S				L	T F		eme	ster: II
Version: 1.2	0.1	67. /		e of App	<b>roval:</b> 161	h BoS 17-		. 1	4	0 0			
No. of	Scheme Periods						2	Scheme o				10	0
	/ Week	: 60	Hrs.							<u>im Score</u> valuatior		10 30	
Periods	Credits	: 4						Inte		Semeste		70	
Instructio			ture							Duration			, Hrs.
Prerequisite(s):									LAUIII	Durution			
Course Objectiv		8-											
2. To deve 3. To expl		lem solvi ledge rej	ing skills presenta	by searc tion, pro	ching. blem sol		reasoning						
		ertainty	and desi	ign agen	ts to han	dle them.							
Course Outcom	es (CO):				<u> </u>							1.0	
COs No.					Statem						Jutco	mes	<u>, ,</u>
CO <sub>1</sub>						limits of	the intellig	ent syste	ms.			)1, <b>P</b> (	
CO <sub>2</sub>	Analyze t	1		0,	0							2, <b>P</b>	
CO <sub>3</sub>												4, P	
CO <sub>4</sub>	agents to them	handle					-		-				PO <sub>10</sub>
<b>PO</b> <sub>1</sub> − Engineering problems, <b>PO</b> <sub>5</sub> − M or team work, <b>PO</b> <sub>5</sub>	odern too	l usage, <b>P</b>	O <sub>6</sub> - The e PO <sub>11</sub> - Pro	engineer a ject mana	and societ	y, <b>PO</b> 7- En nd finance	vironment a	and sustair long Learn	nability ing				
Course													
Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	P	011	PO <sub>12</sub>
CO1	3	2	-								_		
		2	2	0	0								
CO <sub>3</sub> CO <sub>4</sub>				2	2				2	3			
$CO_4$			1_	—	able 2 = 0	Significar	nt; 3 – Stro		2	5			
Detailed Conter	nte:		1-	Reuson	idie, 2 – 1	siynijicar	ii, 5 - 5110	iy					
Unit: 1		Founda Agents Rationa Multi-a	ation of : Agents al Agent, agent Sys	Intellige and Ei Structur stems.	ent Syste nvironmo re of an A	ems, Knov ents, Cha Agent, Ref	ent Syster vledge-bas racteristic lex agents d Search (	sed syste s of Inte , Goal-bas	ms, Ex elligent sed ag	kpert Sy Agents ents, Uti	stems s, Def lity-b	. Int initio ased	elligent on of a agents
Unit: 2		Search First Se Beam Prunin	, Iterativ earch, A* Search; g.	ve Deepo Search, Online	ening DI IDA* Se Search;	S, Bidire arch; Hill Adversa	ctional Sea Climbing S rial Searcl	arch; Info learch, Sin n: The n	ormed mulate ninima	(Heuris ed Annea ax algor	tic) Se lling S ithm,	earcl earc Alp	n: Best∙ h, Loca ha-Beta
Unit: 3		Equiva in First	lence, Va Order L	alidity, S ogic; Ru	atisfiabil le Based	ty, Resolı System; I	ning: Pro ution; First Forward an	Order Pı d Backwa	redicat rd Cha	e Logic aining.	(FOPI	.); In	ference
Unit: 4		Bayesia Theory	an Reaso v: Fuzzy (	ning, Ba Sets, Re	yesian N presentii	etworks,	Jncertainty Introductio Sets, Oper odels.	on to Den	npster	-Shafer	Theor	y; Fı	ızzy Se
Unit: 5		<b>Biolog</b> i Hebb's Algorit	i <b>cal Four</b> Rule, hms: Cre	<b>ndations</b> Single ossover,	<b>to Inte</b> &Multi- Mutatio	<b>lligent Sy</b> layer Pe n, Select	v <b>stems</b> : Art erceptron, ion; Introd n; Hybrid I	Backpro luction to	opagat o Parti	ion Alg icle Swa	gorithi	n;	Genetio
Examination ar exams/assignm examination. Text Books:		tion Pat	t <b>tern:</b> It	include	both in	ernal eva	luation (3	0 marks)	comp	rising tv			

1	CrinaGrosan, Ajith Abraham, "Intelligent Systems: A Modern Approach ", Springer-Verlag, 2011
2	Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 4 <sup>th</sup> ed., Pearsons, 2022
Refe	rence Books:
1	Adrian A. Hopgood, "Intelligent systems for engineers and scientists", 4 <sup>th</sup> ed., CRC press, 2021
2	Denis Rothman, "Artificial Intelligence By Example", Packt Publishing, 2018

MTCS213	ode				Course '				1	cture		
	PET		Det			resentati			L	T P	Se	mester: II
Version: 1.2	Scheme	ofIngte		e of Appi	roval: 161	h BoS 17-			4	0 0		
No	of Periods	г т	Hrs.				2	Scheme of		m Score	•	100
	ds/Week	: 4	1115.							aluation	•	30
1 01100	Credits	: 4						me		emester	:	70
Instruct	ion Mode	• •	ture							ouration	:	3 Hrs.
Prerequisite(s									-			
Course Object		0										
1. Describe	about the	e curren	t web d	evelopn	nent and	1 emerge	ence of so	cial web				
2. Design m	odeling, a	ggregat	ting and	knowle	edge rep	resentat	tion of sen	nantic w	eb.			
3. Describe	Associati	on rule	mining a	algorith	ms.							
4. Summaria			0	0		ng of soc	ial web.					
Course Outcon	mes (CO):	0			Ū	0						
COs No.					Statem	ent				M	apped	Program
										0		nes (POs)
CO <sub>1</sub>	Understa	and the b	pasics of	social ne	etwork a	nalysis.					PO <sub>1</sub>	, <b>PO</b> <sub>2</sub>
$CO_2$	Analyze	Ontology	y represe	ntation	of social	network	data.				$PO_2$	, <b>PO</b> ₃
CO <sub>3</sub>	Apply su	pervised	and uns	upervise	d algorit	hms on so	ocial netwo	orks.			<b>PO</b> <sub>4</sub>	, <b>PO</b> <sub>5</sub>
CO <sub>4</sub>	Interpre	t the sen	nantic co	ntent of	social m	edia data.				P	<b>O</b> 4, <b>P</b>	O9, PO10
PO1- Engineerin												
problems, PO5-										PO <sub>8</sub> - Ethi	cs, <b>PO</b>	9- Individua
or team work, P	0 <sub>10</sub> - Commu	inication,										
Course			марр	ing of co	ourse out	comes wi	ith progran	n outcom	es			
Outcomes	PO <sub>1</sub>	$PO_2$	PO <sub>3</sub>	$PO_4$	PO <sub>5</sub>	$PO_6$	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO	P11 PO <sub>12</sub>
	3	2										
	5	2	2									
CO3				2	2							
CO <sub>4</sub>												
				2					2	3		
			1 -	-	ıble; 2 – 1	Significan	it; 3 – Stroi	ng	2	3		
Detailed Conto	ents:			Reasona		* *		•				
	ents:		DUCTIO	Reasona	oduction	to Web	-Limitati	ons of c	urrent	Web -		-
Detailed Conte		Seman	<b>DUCTIO</b> tic Web·	Reasona N: Intro -Emerge	oduction ence of t	to Web he Social	-Limitati Web –Sta	ons of c atistical P	urrent Properti	Web – ies of So	cial 1	Vetworks
		Seman Netwo	<b>DUCTIO</b> tic Web- rk analys	Reasona DN: Intro -Emerge sis -Deve	oduction nce of t	to Web he Social t of Socia	-Limitati Web –Sta l Network	ons of c atistical P Analysis	eurrent Properti -Key co	Web – ies of So oncepts	ocial N and n	Networks neasures in
Detailed Conte		Seman Netwo netwoi	DUCTIO tic Web- rk analys rk analys	Reasona DN: Intro -Emerge sis -Deve	oduction nce of t	to Web he Social t of Socia	-Limitati Web –Sta	ons of c atistical P Analysis	eurrent Properti -Key co	Web – ies of So oncepts	ocial N and n	Networks neasures in
Detailed Conte		Seman Netwo netwo netwo	DUCTIC tic Web- rk analys rk analy rks.	Reasona PN: Intro -Emerge sis -Deve sis -Dis	oduction ence of t elopment scussion	to Web he Social t of Socia network	–Limitati Web –Sta l Network s –Blogs	ons of c atistical P Analysis and onl	urrent Properti -Key co ine co	Web – ies of So oncepts mmunit	ocial N and n ies -'	Vetworks neasures in Web-base
Detailed Conte		Seman Netwo networ networ <b>MODE</b>	DUCTIC tic Web- rk analys rk analy rks. LLING, A	Reasona PN: Intro -Emerge sis -Deve sis -Dis	oduction ince of t elopment scussion	to Web he Social t of Socia network	-Limitatie Web -Sta Network s -Blogs	ons of c atistical P Analysis and onl <b>REPRES</b>	urrent Properti -Key co ine co ENTAT	Web – ies of Sc oncepts mmunit <b>ION:</b> On	ocial M and n ies -' tology	Vetworks neasures in Web-base y and thei
Detailed Conte		Seman Netwo networ networ <b>MODE</b> role in	DUCTIO tic Web- rk analys rk analy rks. LLING, A the Sem	Reasona PN: Intro -Emerge sis -Deve sis -Dis AGGREG nantic W	oduction ence of t elopment scussion ATING a eb: Onto	to Web he Social t of Socia network AND KNC	-Limitatio Web -Sta Network S -Blogs <b>DWLEDGE</b> ed knowled	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre	urrent Properti -Key co ine co ENTAT	Web – ies of So oncepts ommunit <b>ION:</b> On	tology	Vetworks neasures in Web-base y and thei y language
Detailed Conte	1	Seman Netwo networ networ <b>MODE</b> role in for the Modeli	DUCTIO tic Web- rk analys rk analy rks. LLING, A the Sem e Semar ng and	Reasona PN: Intro -Emerge sis -Deve sis -Dis AGGREG hantic Well aggreg	oduction ence of t elopment ccussion ATING eb: Onto c: Resou gating s	to Web he Social t of Socia network AND KNO ology-base rce Desc ocial net	-Limitation Web –Sta Network S –Blogs <b>DWLEDGE</b> ed knowled cription Fr twork dat	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre amework ca: State	urrent Properti -Key co ine co ENTAT esentat c -Web -of-the	Web – ies of So oncepts mmunit <b>ION:</b> On ion –On o Ontolo e-art in	tology by L by L by L by L	Networks neasures in Web-based y and thei y language anguage work dat
Detailed Conto Unit:	1	Seman Netwo networ networ role in for the Modeli represe	<b>DUCTIO</b> tic Web- rk analys rk analy rks. <b>LLING,</b> A the Sem e Semar ng and entation	Reasona PN: Intro -Emerge sis -Deve sis -Dis AGGREG hantic Wel aggreg -Ontolo	oduction ence of t elopment cussion <b>ATING</b> eb: Onto b: Resou ating s gical rep	to Web he Social tof Socia network AND KNC ology-base rce Desc ocial net presentati	-Limitation Web -State Network S -Blogs <b>OWLEDGE</b> ed knowled cription Fr twork date on of social	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre amework ca: State l individu	eurrent Properti -Key co ine co ENTAT esentat c -Web -of-the uals -Oi	Web – ies of So oncepts mmunit <b>ION:</b> On ion –On o Ontolo e-art in ntologica	ocial M and n ies -' tology tology ogy L netv al repr	Networks neasures in Web-based y and thei y language anguage work dat resentation
Detailed Conto Unit:	1	Seman Netwo networ networ MODE role in for the Modeli repress of soc	DUCTIO tic Web- rk analys rk analys rks. LLING, A the Sem e Semar ng and entation ial relati	Reasona PN: Intro -Emerge sis -Deve sis -Dis AGGREG nantic We aggreg -Ontolo onships	oduction ence of t elopment cussion <b>ATING</b> eb: Onto b: Resou ating s gical rep	to Web he Social tof Socia network AND KNC ology-base rce Desc ocial net presentati	-Limitation Web –Sta Network S –Blogs <b>DWLEDGE</b> ed knowled cription Fr twork dat	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre amework ca: State l individu	eurrent Properti -Key co ine co ENTAT esentat c -Web -of-the uals -Oi	Web – ies of So oncepts mmunit <b>ION:</b> On ion –On o Ontolo e-art in ntologica	ocial M and n ies -' tology tology ogy L netv al repr	Networks neasures in Web-based y and thei y language anguage work dat resentation
Detailed Conto Unit:	1	Seman Netwo networ <b>MODE</b> role in for the Modeli represe of soc represe	DUCTIO tic Web- rk analys rk analys rks. LLING, A the Semar ng and entation ial relati entations	Reasona PN: Intro -Emerge sis -Deve sis -Dis AGGREG hantic Wel aggreg -Ontolo onships s.	ATING action ATING action ATING action actio	to Web he Social tof Socia network AND KNO ology-base rce Dese ocial net presentati gating and	-Limitatio Web –Sta Network s -Blogs <b>DWLEDGE</b> ed knowled cription Fr twork dat on of socia d reasonin	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre camework ca: State l individu g with s	eurrent Properti -Key co ine co ENTAT esentat c -Web -of-the ials -Or ocial n	Web – ies of So oncepts mmunit <b>ION:</b> On ion –On o Ontolo e-art in ntologic: etwork	tology tology by L net al rep data	Networks neasures in Web-based y and thei r language anguage work dat resentation –Advanced
Detailed Conto Unit:	1	Seman Netwo networ <b>MODE</b> role in for the Modeli repress of soc repress <b>ALGOE</b>	DUCTIC tic Web- rk analys rk analys rk analy rks. LLING, A the Semar ng and entation ial relati entations RITHMS	Reasona PN: Intro -Emerge sis -Deve sis -Dis AGGREG hantic Wel aggreg -Ontolo onships S. AND	oduction ence of t elopment cussion ATING eb: Onto b: Resou gical rep –Aggreg TECHNI	to Web he Social tof Socia network AND KNO ology-base rce Desc ocial net oresentati gating and QUES: 4	-Limitatio Web -Sta Network s -Blogs <b>OWLEDGE</b> ed knowled cription Fr twork dat on of socia d reasonin	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre- amework a: State al individu ng with s	eurrent Properti -Key co ine co ENTAT esentati c -Web -of-the ials -On ocial n Mining	Web – ies of So oncepts mmunit <b>ION:</b> On ion –On o Ontolo e-art in ntologic: etwork	tology tology tology by L netval repr data	Networks neasures in Web-based y and their language anguage work dat resentation –Advanced Learning
Detailed Conto Unit:	2	Seman Netwo networ <b>MODE</b> role in for the Modeli represe of soc represe <b>ALGOI</b> Unsup	DUCTIC tic Web- rk analys rk analys rks. LLING, A the Sem e Semar ng and entation ial relati entations RITHMS ervised I	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Dis AGGREG antic Wel aggreg -Ontolo onships s. AND Learning	ATING ATING S Control	to Web he Social tof Socia network AND KNO ology-base rce Desc ocial net oresentati gating and QUES: 4 upervised	-Limitatio Web -Sta Network s -Blogs <b>OWLEDGE</b> ed knowled cription Fr twork dat on of socia d reasonin Association Learning,	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre- amework ca: State d individu ng with s Markov r	eurrent Properti -Key co ine co <b>ENTAT</b> esentat c -Web -of-the alls -On ocial n Mining models,	Web – ies of So oncepts mmunit <b>ION:</b> Or ion –On o Ontolo e-art in ntologic: etwork , Super K-Near	vised est Notes	Networks neasures in Web-base y and their language anguage work dat resentation –Advance Learning eighboring
Detailed Conto Unit: Unit: 1	2	Seman Netwo networ <b>MODE</b> role in for the Modeli represe of soc represe <b>ALGOF</b> Unsup Conter	DUCTIO tic Web- rk analys rk analys rks. LLING, A the Sem e Semar ng and entation ial relati entations RITHMS ervised I nt-based	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Dis AGGREG antic Wel aggreg -Ontolo onships s. AND Learning. Recomr	ATING ATING Construction ATING Construction	to Web he Social c of Socia network AND KNO ology-base rce Desc ocial net oresentati gating and QUES: A upervised n, Collab	-Limitation Web -State Network States -Blogs <b>DWLEDGE</b> ed knowled cription Fr twork date on of social d reasoning Association Learning, orative Filt	ons of c atistical F Analysis and onl <b>REPRES</b> dge Repre- camework car State al individu ng with s n Rule Markov r tering Re	ENTAT Coperti -Key co ine co ENTAT esentat c -Web -of-the uals -On ocial n Mining nodels, comme	Web – ies of So oncepts mmunit <b>ION:</b> On ion –On o Ontolo e-art in ntologica etwork , Super K–Near endation	ocial N and n ies -' tology tology bgy L netv al repu data vised est Ne Socia	Vetworks neasures in Web-based y and their language anguage work dat resentation –Advanced Learning eighboring al Networ
Detailed Conto Unit: Unit: 1	2	Seman Netwo networ <b>MODE</b> role in for the Modeli represe of soc represe <b>ALGOI</b> Unsup Conter Analys	DUCTIO tic Web- rk analys rk analys rks. LLING, A the Sem e Semar ng and entation ial relati entations RITHMS ervised I nt-based is, Detec	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Dis AGGREG antic Wel aggreg -Ontolo onships s. AND Learning Recomr ting Con	oduction ence of t elopment scussion ATING eb: Onto b: Resou gating s gical rep -Aggreg TECHNI , Semi-su nendatio munity	to Web he Social tof Socia network AND KNO blogy-base rce Desc ocial net oresentati gating and QUES: 4 upervised n, Collab Structure	-Limitation Web -State Network S -Blogs <b>OWLEDGE</b> ed knowled cription Fr twork date on of social d reasonin Association Learning, orative Filt	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre amework ta: State l individu g with s Markov r tering Re ks, the Ev	ENTAT coperti -Key co ine co ENTAT esentat c -Wet -of-the uals -On ocial n Mining, models, comme volution	Web – ies of So oncepts mmunit <b>ION:</b> On o Ontolo e-art in ntologica etwork , Super K-Near endation o Socia	tology tology tology by L netval repr data vised est Net	Vetworks neasures in Web-based y and thei anguage anguage work dat resentation –Advanced Learning eighboring al Networks.
Detailed Cont Unit: Unit: 5	2	Seman Netwo networ <b>MODE</b> role in for the Modeli repress of soc repress <b>ALGOI</b> Unsup Conter Analys	DUCTIO tic Web- rk analys rk analys rks. LLING, A the Sem e Semar ng and entation ial relati entations RITHMS ervised I nt-based is, Detec CTING	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Dis AGGREG antic Wel aggreg -Ontolo onships s. AND Learning, Recomr ting Com AND AN	ATING clopment cussion ATING eb: Onto control	to Web he Social of Socia network AND KNO blogy-base rce Desc ocial ne oresentati gating and QUES: A upervised n, Collab Structure G WEB S	-Limitation Web -State Network States -Blogs <b>DWLEDGE</b> ed knowled cription Fr twork date on of social d reasoning Association Learning, orative Filt	ons of c atistical P Analysis and onl <b>REPRESI</b> dge Repre- camework ta: State il individu ng with s Markov n tering Re ks, the Ex <b>CTWORKS</b>	wirrent Properti -Key co ine co ENTAT esentat c -Web -of-the ials -Oi ocial n Mining models, comme <u>volutior</u> S: Extra	Web – ies of So oncepts ommunit <b>ION:</b> On o Ontolo e-art in ntologica etwork , Super K-Near endation o of Socia acting E	tology tology tology by L netval repr data vised socia <u>al Net</u> voluti	Vetworks neasures in Web-based y and thei anguage anguage work dat resentation –Advanced Learning eighboring al Networks. on of Wel
Detailed Conto Unit: Unit: 1	2	Seman Netwo networ <b>MODE</b> role in for the Modeli repress of soc repress <b>ALGOP</b> Unsup Conter Analys <b>EXTRA</b>	DUCTIO tic Web- rk analys rk analys rks. LLING, A the Sem e Semar ng and entation ial relati entations ervised I nt-based is, Detec CTING unity fro	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Dis AGGREG antic Wel aggreg -Ontolo onships s. AND .earning, Recomr ting Com AND AN om a Se	ATING cussion ATING cussion ATING cb: Onto cb: Resou gating s gical rep -Aggreg TECHNI , Semi-su nendatio munity ALYZIN ries of V	to Web he Social of Socia network AND KNO blogy-base rce Desc ocial net oresentati gating and QUES: A upervised n, Collab Structure G WEB S Web Arch	-Limitation Web -State Network S -Blogs OWLEDGE ed knowled cription Fr twork date on of social d reasonin Association Learning, orative Fill in Networ SOCIAL NE	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre- camework ta: State il individung with s Markov r tering Re ks, the Ev <b>CTWORKS</b> oral Anal	wurrent Properti -Key co ine co ENTAT esentat -Othe als -Othe als -Othe als -Othe ocial n Mining nodels, comme <i>v</i> olutior <b>S:</b> Extra lysis or	Web – ies of So oncepts mmunit <b>ION:</b> On o Ontolo e-art in ntologica etwork , Super K-Near endation o of Socia acting E n Seman	tology tology tology by L netval repr data vised socia al Net voluti	Vetworks neasures in Web-based y and thei language anguage work dat resentation –Advanced Learning eighboring al Networl works. on of Wel raph using
Detailed Cont Unit: Unit: 5	2	Seman Netwo networ <b>MODE</b> role in for the Modeli represe of soc represe <b>ALGOI</b> Unsup Conter Analys <b>EXTRA</b> Comm Three- Dynam	DUCTIO tic Web- rk analys rk analys rk analys rk analy rks. LLING, A the Semar ng and entation ial relati entations entations entations attents ervised I nt-based is, Detec CTING unity fro Way Te nic Netwo	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Deve sis -Deve sis -Deve sis -Deve aggrege -Ontolo onships s. AND Learning. Recommended Recomm	ATING ATING Constant	to Web he Social of Socia network AND KNO ology-base rce Desc ocial net oresentati gating and QUES: A upervised n, Collab Structure G WEB S Web Arch sition, Ar	-Limitatio Web -Sta Network s -Blogs <b>OWLEDGE</b> ed knowled cription Fr twork dat on of socia d reasonin Association Learning, orative Filt in Networ <b>SOCIAL NH</b> nive, Temp nalysis of	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre- amework ca: State di individu g with s Markov r tering Re ks, the Ev <b>CTWORKS</b> oral Anal Commur	urrent Properti -Key co ine co ENTAT esentat c -Wet -of-the als -Or ocial n Mining, nodels, comme volution S: Extra lysis or nities a	Web – ies of So oncepts mmunit ION: On o Ontolo e-art in ntologica etwork , Super K-Near endation of Socia acting E n Semar and the	ocial N and n ies -' tology tology by L netv al repu data vised est No social Net voluti tic G r Evo	Networks neasures in Web-based y and thei y and thei y anguage anguage work dat resentation -Advanced Learning eighboring al Networl works. on of Wel raph using
Detailed Cont Unit: Unit: 5	2	Seman Netwo networ networ <b>MODE</b> role in for the Modeli represe of soc represe <b>ALGOI</b> Unsup Conter Analys <b>EXTRA</b> Comm Three- Dynam	DUCTIO tic Web- rk analys rk analys rk analys rks. LLING, A the Semar entation ial relati entation ial relati entations ervised I nt-based is, Detecc CTING unity fro Way Te ic Netwo CATIONS	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Deve sis -Deve sis -Deve sis -Deve aggreg -Ontolo onships aggreg -Ontolo onships s. AND Learning Recommendation ting Commendation AND AN om a Se ensor, D orks. S: A Lear	ATING ATING Construction ATING Construction	to Web he Social of Socia network AND KNO ology-base rce Desc ocial net oresentati gating and QUES: A upervised n, Collab Structure G WEB S Web Arch sition, Ar ed Appro	-Limitatio Web -Sta Network s -Blogs <b>OWLEDGE</b> ed knowled cription Fr twork dat on of socia d reasonin Association Learning, orative Filt in Networ <b>SOCIAL NE</b> nive, Temp nalysis of ach for Rea	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre- amework ca: State d individu og with s Markov r tering Re ks, the Ev <b>CTWORKS</b> oral Anal Commur	ENTAT Properti -Key co ine co ENTAT esentation -of-the value -of-the value -of- ocial n Mining, models, comme volution S: Extra lysis or nities a motion	Web – ies of So oncepts ommunit ION: On ion –On o Ontolo e-art in ntologic: etwork , Super K-Near endation of Socia acting E o Semar and the Classifie	vised vised al Net voluti tic G r Evo	Vetworks neasures in Web-based y and their language anguage work dat resentation -Advanced Learning eighboring al Network works. on of Wel raph using olutions in of Tweets
Detailed Conto Unit: Unit: : Unit: :	1 2 3 4	Seman Netwo networ networ <b>MODE</b> role in for the Modeli repress of soc repress <b>ALGOF</b> Unsup Conter Analys <b>EXTRA</b> Comm Three- Dynam	DUCTIO tic Web- rk analys rk analys rk analys rks. LLING, A the Sem e Semar ng and entation ial relati entations entations al relati entations entations al relati entations cathebre cathebre Way Te tic Netwo CATIONS	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Deve sis -Dis AGGREG antic Wel aggreg -Ontolo onships s. AND Learning. Recommendation ting Commendation AND AN om a Sector orks. S: A Lear ic Approc	ATING ATING Construction ATING Construction	to Web he Social of Socia network AND KNO ology-base rce Desc ocial net oresentati gating and QUES: A upervised n, Collab Structure G WEB S Web Arch sition, Ar ed Appro ssess the	-Limitatio Web -Sta Network s -Blogs <b>OWLEDGE</b> ed knowled cription Fr twork dat on of socia d reasonin Association Learning, orative Filt in Networ <b>SOCIAL NI</b> nive, Temp nalysis of ach for Rea Opinion o	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre- amework ca: State d individu ng with s Markov r tering Re ks, the Ev oral Anal Commur	wurrent Properti -Key co ine co ENTAT esentat c -Wet -of-the uals -On ocial n Mining, nodels, comme rolution S: Extra lysis or nities a motion n Social	Web – ies of So oncepts mmunit ION: On ion –On o Ontolo e-art in ntologic: etwork , Super K-Near endation <u>o of Socia</u> acting E n Seman nd the Classifie Networ	vised vised vised Note: vised vised vised vised vised vised vised est Na Social Net: voluti tic G r Evo cation k Env	Vetworks neasures in Web-based y and their language anguage work dat resentation -Advanced Learning eighboring al Network works. on of Wel raph using olutions in of Tweets ironments
Detailed Cont Unit: Unit: 5	1 2 3 4	Seman Netwo networ networ <b>MODE</b> role in for the Modeli represe of soc represe <b>ALGOH</b> Unsup Conter Analysi <b>EXTRA</b> Comm Three- Dynam <b>APPLIO</b> A New Explain	DUCTIO tic Web- rk analys rk analys rk analys rks. LLING, A the Sem e Semar ng and entation ial relati entations attriations a	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Deve sis -Deve sis -Deve sis -Deve aggreg -Ontolo onships aggreg -Ontolo onships s. AND Learning Recommendation ting Com AND AN om a Se nsor, D orks. S: A Lear ic Appro- entific an	ATING ATING Construction ATING Construction	to Web he Social of Socia network AND KNO ology-base rce Desc ocial net oresentati gating and QUES: A upervised n, Collab Structure G WEB S Web Arch sition, Ar ed Appro ssess the	-Limitatio Web -Sta Network s -Blogs <b>OWLEDGE</b> ed knowled cription Fr twork dat on of socia d reasonin Association Learning, orative Filt in Networ <b>SOCIAL NE</b> nive, Temp nalysis of ach for Rea	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre- amework ca: State d individu ng with s Markov r tering Re ks, the Ev oral Anal Commur	wurrent Properti -Key co ine co ENTAT esentat c -Wet -of-the uals -On ocial n Mining, nodels, comme rolution S: Extra lysis or nities a motion n Social	Web – ies of So oncepts mmunit ION: On ion –On o Ontolo e-art in ntologic: etwork , Super K-Near endation <u>o of Socia</u> acting E n Seman nd the Classifie Networ	vised vised vised Note: vised vised vised vised vised vised vised est Na Social Net: voluti tic G r Evo cation k Env	Vetworks neasures in Web-base y and their y and their anguage anguage work dat resentation –Advance Learning eighboring al Networ works. on of Wei raph using olutions in of Tweets ironments
Detailed Conto Unit: Unit: 1 Unit: 1	1 2 3 4 5	Seman Netwo networ networ <b>MODE</b> role in for the Modeli repress of soc repress <b>ALGOI</b> Unsup Conter Analys <b>EXTRA</b> Comm Three- Dynam <b>APPLIO</b> A New Explain Biomet	DUCTIO tic Web- rk analys rk analys rk analys rks. LLING, A the Sem e Semar ng and entation ial relati entations attriations a	Reasona PN: Intro -Emerge sis -Deve sis -Deve sis -Deve sis -Deve sis -Deve sis -Deve sis -Deve aggreg -Ontolo onships -Ontolo onships s. AND Learning Recomr ting Com AND AN om a Se ensor, D orks. S: A Lear ic Appro entific an olate Pro	ATING ATING Construction ATING Construction	to Web he Social of Socia network AND KNO ology-base rce Desc ocial net oresentati gating and QUES: A upervised n, Collab Structure G WEB S Web Arch sition, Ar ed Appro ssess the nical Em	<ul> <li>-Limitation</li> <li>Web –State</li> <li>Web –State</li> <li>Network</li> <li>Second State</li> <li>Network</li> <li>OWLEDGE</li> <li>ed knowledder</li> <li>ed knowledder</li> <li>cription Fretwork date</li> <li>on of social</li> <li>d reasoning</li> <li>Association</li> <li>Learning,</li> <li>orative Filter</li> <li>in Networe</li> <li>SOCIAL NE</li> <li>nive, Temp</li> <li>nalysis of</li> <li>ach for Reate</li> <li>Opinion o</li> <li>ergence Formation</li> </ul>	ons of c atistical P Analysis and onl <b>REPRES</b> dge Repre- amework ta: State l individu ng with s Markov r tering Re ks, the Ev <b>CTWORKS</b> oral Anal Commun al Time E f Users in orecasting	wirrent Properti -Key co ine co ENTAT esentat c -Web -of-the ials -Or ocial n Mining nodels, comme <i>rolution</i> S: Extra lysis or nities a motion n Social g, Soci	Web – ies of So oncepts mmunit ION: On o Ontolo e-art in ntologica etwork , Super K-Near endation of Socia acting E n Semar and the Classifie Networ al Networ	ocial N and n ies -' tology tology by L netv al repr data vised social Net voluti tic G r Evo cation k Env ork A	Vetworks neasures in Web-based y and thei anguage anguage work dat resentation –Advanced Learning eighboring al Network works. on of Wel raph using olutions in of Tweets nalysis fo

-	
exan	nination.
Text	Books:
1	Peter Mika, "Social Networks and the Semantic Web", Springer, 1st edition, 2007.
2	Guandong Xu , Yanchun Zhang and Lin Li, "Web Mining and Social Networking –Techniques and applications",
	Springer, 1st edition, 2012.
Refe	rence Books:
1	Ajith Abraham, Aboul Ella Hassanien, Václav Snášel, "Computational Social Network Analysis: Trends, Tools and
	Research Advances", Springer, 2012.
2	Giles, Mark Smith, John Yen, "Advances in Social Network Mining and Analysis", Springer, 2010.

	ode				Course '	Title			Le	cture			
MTCS214	PET					er Interf			L	Т	Р	Sei	nester: II
Version: 1.2				e of App	roval: 16	th BoS 17-			4	0	0		
	Scheme	1 I						Scheme o				r	
	f Periods		Hrs.						/laximu			:	100
Perioc	s/Week	: 4						Inte	ernal Ev			:	30
<b>T</b> , , , ,	Credits	: 4							End S			:	70
Prerequisite(s)	on Mode		ture						Exam l	Jurati	lon	:	3 Hrs.
Course Objecti		menige	nce										
1. To gain an general, an	d alternat	ives to ti	raditiona	ıl "keybo	ard and	mouse" co	omputing;		U				Ũ
<ol> <li>To be able interaction</li> <li>To be fami virtual and</li> <li>To underst</li> </ol>	tasks and liar with a augmente	recogni variety o d reality	ze the lin of both c 7, mobile	mits of h convention and wea	onal and arable co	erformanc non-trad mputing,	e as they a itional use and ubiqui	pply to c interfac tous com	ompute e parac iputing	er ope ligms, ;	eratio , the	on; lattei	· including
technologi					- 87					0			0
Course Outcon	2												
COs No.					Statem	ent							Program es (POs)
CO <sub>1</sub>	Ability to program			elop use	er interfa	ces using	industry-s	standard	tools a	nd			PO <sub>2</sub>
CO <sub>2</sub>	•	o evalua	0 0	nalyze ι	user inte	rfaces us	ing approp	oriate me	trics a	nd		<b>PO</b> <sub>2</sub> ,	PO <sub>3</sub>
CO <sub>3</sub>		anding o					ce design i	n HCI an	d how	to		<b>PO</b> <sub>4</sub> ,	PO <sub>5</sub>
CO <sub>4</sub>		ty with	emergin	ıg techn	ologies	and trend	ls in HCI, ed reality	such as	machi	ne	PC	<b>)</b> 4, <b>P</b> (	<b>D</b> 9, <b>PO</b> 10
		- <b>D</b> O D	nahlam ar	alvaia D				tions DO	Candi	ent inve	octic	otiona	of complex
problems, <b>PO</b> <sub>5</sub> - M or team work, <b>PC</b>	Aodern too	l usage, <b>P</b>	<b>0</b> 6- The 6 <b>PO</b> 11- Pro	engineer ject mana	O₃- Design and socie agement a	n/developi ty, <b>PO</b> 7- Er nd finance	nent of solu	and sustain long Learr	nability, ning				of complex - Individual
	Aodern too	l usage, <b>P</b>	<b>0</b> 6- The 6 <b>PO</b> 11- Pro	engineer ject mana	O₃- Design and socie agement a	n/developi ty, <b>PO</b> 7- Er nd finance	nent of solu wironment : , <b>PO</b> 12- Life-	and sustain long Learr	nability, ning		Ethic		- Individual
or team work, PC	Modern too D <sub>10</sub> - Commu	l usage, <b>P</b> nication,	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp	engineer ject mana oing of co	<b>O</b> <sub>3</sub> - Design and socie agement a ourse ou	n/developi ty, <b>PO</b> 7- Er nd finance tcomes w	nent of solu wironment a , <b>PO<sub>12</sub>-</b> Life- ith program	and sustain long Learr n outcom	nability, ning nes	<b>PO</b> <sub>8</sub> - ]	Ethic	s, <b>PO</b> s	- Individual
or team work, PC Course Outcomes	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub>	l usage, <b>P</b> nication, <b>PO</b> <sub>2</sub>	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp	engineer ject mana oing of co	<b>O</b> <sub>3</sub> - Design and socie agement a ourse ou	n/developi ty, <b>PO</b> 7- Er nd finance tcomes w	nent of solu wironment a , <b>PO<sub>12</sub>-</b> Life- ith program	and sustain long Learr n outcom	nability, ning nes	<b>PO</b> <sub>8</sub> - ]	Ethic	s, <b>PO</b> s	- Individual
or team work, PC Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub>	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub>	engineer ject mana oing of co	<b>O</b> <sub>3</sub> - Design and socie agement a ourse ou	n/developi ty, <b>PO</b> 7- Er nd finance tcomes w	nent of solu wironment a , <b>PO<sub>12</sub>-</b> Life- ith program	and sustain long Learr n outcom	nability, ning nes	PO <sub>8</sub> - 1	Ethic	s, <b>PO</b> s	- Individual
Course Outcomes CO <sub>1</sub> CO <sub>2</sub>	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub>	PO <sub>2</sub>	06- The 6 PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2	engineer ject mana ing of co PO <sub>4</sub> 2 2	D <sub>3</sub> - Design and socie agement a ourse ou PO <sub>5</sub>	n/developn ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6	nent of solu vironment : , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub>	and sustain long Learr n outcom PO <sub>8</sub>	nability, ning nes	<b>PO</b> <sub>8</sub> - ]	Ethic	s, <b>PO</b> s	- Individual
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	Aodern too D <sub>10</sub> - Commu PO1 3	PO <sub>2</sub>	06- The 6 PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2	engineer ject mana ing of co PO <sub>4</sub> 2 2	D <sub>3</sub> - Design and socie agement a ourse ou PO <sub>5</sub>	n/developn ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6	nent of solu wironment a , <b>PO<sub>12</sub>-</b> Life- ith program	and sustain long Learr n outcom PO <sub>8</sub>	nability, ning nes PO9	PO <sub>8</sub> - 1	Ethic	s, <b>PO</b> s	- Individual
or team work, PC Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub>	Aodern too D <sub>10</sub> - Commu PO1 3	PO2	PO <sub>6</sub> - The o PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 1-	PO4 PO4 2 2 Reason	D <sub>3</sub> - Design and socie agement a ourse ou PO <sub>5</sub> 2 able; 2 -	n/developn ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 Significar	nent of solu avironment ; , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> 7 <b>PO</b> 7	and sustain long Learr n outcom PO <sub>8</sub>	PO9	PO <sub>8</sub> - 1	Dio	PO:	- Individual
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO <sub>2</sub> 2 2 2 Introdu	06- The 6 PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 1- uction: In	PO4 PO4 2 2 Reason	D <sub>3</sub> - Design and socie agement a ourse our PO <sub>5</sub> 2 able; 2 -	n/developn ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significar</b> er Interfac	nent of solu vironment ; , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> 7 <b>tr; 3 - Stro</b> ce - defini	and sustain long Learr n outcom PO <sub>8</sub> ng tion, imp	PO9 2 ortance	PO <sub>8</sub> -1 PC	Dio B B OOD	PO:	- Individual
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO <sub>2</sub> 2 2 Introdu of good graphic	PO <sub>6</sub> - The o PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1 - uction: In d design. cs, the c	PO4 PO4 2 2 Reason A brief	D <sub>3</sub> - Design and socie agement a ourse our PO <sub>5</sub> 2 able; 2 -	n/developn ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significan</b> er Interfa of Screen manipula	nent of solu vironment : , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>tr</b> ; <b>3 – Stro</b> ce – defini design. Th tion, grapl	nd sustain long Learr n outcom PO <sub>8</sub> ng tion, imp ne graphio nical syst	PO <sub>9</sub> PO <sub>9</sub> 2 ortance cal user em, Ch	PO <sub>8</sub> - 1 PC	Dio Dio B ood offace	PO: PO: desig	- Individual
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 Introdu of good graphie Interfa	PO <sub>6</sub> - The o PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1 - uction: In d design. cs, the c ce popul	PO4 PO4 2 2 Reason A brief oncept o larity, ch	D <sub>3</sub> - Design and socie agement a purse our PO <sub>5</sub> 2 able; 2 -	n/developn ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significan</b> er Interfa- of Screen manipula stics- Prir	nent of solu avironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>tt; 3 - Stro</b> ce - defini design. Th tion, graph aciples of u	PO8 PO8 no utcom PO8 ng tion, imp ne graphic nical syst ser interf	PO9 PO9 2 cortance cal user em, Ch face.	PO <sub>8</sub> - 1 PC	Dio Dio B Cood of face erist	PO: PO: desig e – po ics, W	- Individual
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 Introdu of good graphie Interfa Design	PO <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction: In d design. cs, the c ce popul process	PO4 PO4 2 2 Reason A brief oncept o larity, ch s – Hum	D <sub>3</sub> - Design and socie agement a purse our PO <sub>5</sub> 2 able; 2 - ce of use f history of direct an intera	n/developn ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significan</b> er Interfa- of Screen manipula stics- Prir action wit	nent of solu avironment a , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> et; 3 – Stro ce – defini design. Th tion, grap nciples of u h compute	PO <sub>8</sub> PO <sub>8</sub> ng tion, imp ne graphic nical syst ser interfers, impo	PO9 PO9 2 cortance cal user em, Ch face. rtance	PO <sub>8</sub> - 1 PC	Ethic Dio 3 000d ( fface erist man	PO: PO: desig desig c – po ics, W	- Individual
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 Introdu of good graphic Interfa Design human	PO <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1 - uction: In d design cs, the c ce popul process conside	PO4 PO4 2 2 Reason A brief oncept o larity, ch 5 – Hum eration, 1	D <sub>3</sub> - Design and socie agement a ourse our PO <sub>5</sub> 2 able; 2 -	n/develop ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significar</b> er Interfa of Screen manipula stics- Prir action wit nteraction	nent of solu vironment : , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> et; 3 – Stro design. Th tion, graph neiples of u h compute n speeds, t	PO <sub>8</sub> PO <sub>8</sub> Ition, imp ine graphic inical syst ser interf ers, impo inderstar	PO9 PO9 2 ortance cal user em, Ch face. rtance nding b	PO <sub>8</sub> -1 PC	Ethic Dio Dio Gace erist man ss ju	PO: PO: desig e – po ics, W char nctio	- Individual
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphie Interfa Design human Design	PO <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction: In d design cs, the c ce popul process a conside ing: Des	PO4 PO4 PO4 2 2 Reason A brief oncept of larity, chi s – Hum eration, 1 sign goa	D <sub>3</sub> - Design and socie agement a ourse our PO <sub>5</sub> 2 able; 2 - history of direct an intera Human i als - Sc	n/develop ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significar</b> er Interfa- of Screen manipula stics- Prir action wit nteraction reen pla	nent of solu vironment : , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> 7 <b>PO</b> 7 <b>tr; 3 - Stro</b> ce - defini design. Th tion, graph ciples of u h compute n speeds, u nning and	PO <sub>8</sub> PO <sub>8</sub> routcom PO <sub>8</sub> routcom PO <sub>8</sub> routcom PO <sub>8</sub> routcom	PO9 PO9 2 ortance cal user em, Ch face. rtance nding b e, orga	PO <sub>8</sub> -1 PC PC PC associated PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Dio Ciface erist man ss ju g sc	PO PO desig desig e – po ics, W char nctio reen	- Individual
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction: In d design cs, the c ce popul process a conside ing: Desing of sc	PO4 PO4 2 2 Reason A brief oncept o larity, ch s – Hum eration, l sign goa creen da	03- Design and socie agement a ourse ou PO5 PO5 2 able; 2 − 1 able; 2 − 1 ace of use 5 history of direct haracteris an intera Human i als − So ata and	n/develop ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significar</b> er Interfa- of Screen manipula stics- Prir action wit nteraction reen pla content	nent of solu vironment ; , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> <b>PO</b> 7 <b>tr; 3 - Stro</b> ce - defini design. Th tion, graph ciples of u h compute n speeds, u nning and - screen	PO <sub>8</sub> PO <sub>8</sub> routcom PO <sub>8</sub> routcom PO <sub>8</sub> routcom routco	PO9 PO9 2 ortance cal user em, Ch face. rtance ding b e, orga n and	PO <sub>8</sub> -1 PC PC PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Dio B B Cood of face erist man ss ju g sc - V	PO PO desig desig - po ics, W char nctio reen isuall	- Individual
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphie Interfa Design human Design orderin compo	PO <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction: In d design cs, the c ce popul process a conside ing: Des ng of sc sition –	PO4 PO4 PO4 2 2 Reason A brief oncept of larity, ch s – Hum eration, I sign goa preen da amount	03- Design         and socie         agement a         ourse out         PO₅         PO₅         able; 2 -         able; 2 -         able; 2 -         ince of use         an interation         Human i         als - Sc         and         t of info	n/developn ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significar</b> er Interfa- of Screen manipula stics- Prin action wit nteraction reen pla content rmation	nent of solu vironment a , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> <b>PO</b> 7 <b>ce</b> - defini design. Th tion, graph ciples of u h compute n speeds, u nning and - screen a - focus ar	nd sustain long Learr n outcom PO <sub>8</sub> rg tion, imp e graphic nical syst ser interi ers, impo understar purpose navigation ad empha	PO <sub>9</sub> PO <sub>9</sub> 2 ortance cal user em, Ch face. rtance nding b e, orga n and asis –	PO <sub>8</sub> - 1 PC PC PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Dio Good Fface erist man ss ju g sc - V ntati	PO PO desig desig - po ics, W char nctio reen isuall	- Individual
or team work, PC Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphid Interfa Design human Design orderin compo simply	PO <sub>6</sub> - The o PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction: In d design cs, the c ce popul process conside ing: Des ng of sc sition – and mea	PO4 PO4 PO4 2 2 Reason A brief oncept of larity, ch s – Hum eration, J sign goa creen da amounta	03- Design         and socie         agement a         ourse out         PO₅         PO₅         able; 2 -         able; 2 -         able; 2 -         ince of use         an interation         Human i         als - Sc         and         t of info	n/developn ty, PO7- Er nd finance tcomes w PO6 Significar Significar er Interfa- of Screen manipula stics- Prir action wit nteraction reen pla content rmation re	nent of solu vironment a , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> <b>PO</b> 7 <b>ce</b> - defini design. Th tion, graph ciples of u h compute n speeds, u nning and - screen a - focus ar	nd sustain long Learr n outcom PO <sub>8</sub> rg tion, imp e graphic nical syst ser interi ers, impo understar purpose navigation ad empha	PO <sub>9</sub> PO <sub>9</sub> 2 ortance cal user em, Ch face. rtance nding b e, orga n and asis –	PO <sub>8</sub> - 1 PC PC PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Dio Good Fface erist man ss ju g sc - V ntati	PO PO desig desig - po ics, W char nctio reen isuall	- Individual
Or team work, PC Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphie Interfa Design human Design orderin compo simply consid Windo	PO <sub>6</sub> - The o PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction: In d design. cs, the c ce popul process a conside ing: Des ng of sc sition – and mea eration i ws – New	PO4 PO4 PO4 2 2 Reason A brief oncept of larity, chi sign goa creen da amount aningfull <u>n interfa</u> w and Na	D <sub>3</sub> - Design and socie agement a ourse our PO <sub>5</sub> 2 able; 2 - ce of use f history of direct history of direct an intera Human i als – Soc ata and t of infor y – infor ace desig avigation	n/develop ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significan</b> er Interfa- of Screen manipula stics- Prir action wit nteraction reen pla content rmation re n. schemes	nent of solu vironment : , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> PO <sub>7</sub> tith <b>group</b> <b>t</b> ; <b>3 - Stro</b> ce - defini design. The tion, graph ciples of us h compute h compute h speeds, us nning and - screen to focus an trieval on to selection	PO8 PO8 PO8 rotation, imp re graphic nical syst ser interfers, impo understar purpose navigation ad empha web – star	PO9 PO9 2 cortance cal user em, Ch face. rtance ading b e, orga n and asis – itistical	PO <sub>8</sub> - 1 PC PC PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Gace erist man ss ju g sc – V ntati hics	es, PO PO PO desig - po ics, W char nctio reen isuall ion ir - Tec vices	- Individual
or team work, PC Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphie Interfa Design human Design orderin compo simply consid Windo screen	PO <sub>6</sub> - The o PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction: In d design. cs, the c ce popul process a conside ing: Des ng of sc sition – and mea eration i ws – New -based c	PO4 PO4 PO4 2 2 Reason A brief oncept of larity, ch s – Hum eration, l sign goa creen da amount aningfull n interfa w and Na controls.	D <sub>3</sub> - Design and socie agement a ourse our PO <sub>5</sub> 2 able; 2 - able; 2 - able; an intera Human i als - Sc ata and t of infor y - infor ace design avigation Compor	n/developi ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significan</b> er Interfa- of Screen manipula stics- Prir action wit nteraction reen pla content rmation re n. schemes nents – te	nent of solu vironment : , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> PO <sub>7</sub> tith <b>group</b> <b>t</b> ; <b>3 - Stro</b> ce - defini design. The tion, graph ciples of us h compute h compute h speeds, us nning and - screen to focus an trieval on to selection	PO8 PO8 PO8 rotation, imp re graphic nical syst ser interfers, impo understar purpose navigation ad empha web – star	PO9 PO9 2 cortance cal user em, Ch face. rtance ading b e, orga n and asis – itistical	PO <sub>8</sub> - 1 PC PC PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Gace erist man ss ju g sc – V ntati hics	es, PO PO PO desig - po ics, W char nctio reen isuall ion ir - Tec vices	- Individual
Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphie Interfa Design human Design orderin compo simply consid Windo screen colors,	PO <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction: In d design. cs, the c ce popul process a conside ing: Des ng of sc sition – and mea eration i ws – New -based c uses pro	PO4 PO4 PO4 2 2 Reason A brief oncept of larity, ch s – Hum eration, l sign goa preen da amount aningfull n interfa w and Na controls.	$D_3$ - Design and socie agement a ourse our $PO_5$ $PO_5$ 2 <i>able;</i> 2 - <i>able;</i> 2 - <i>ab</i>	n/developi ty, <b>PO</b> 7- Er nd finance tcomes w <b>PO</b> 6 <b>Significan</b> er Interfa of Screen manipula stics- Prir action wit nteraction reen pla content rmation re n. schemes nents – te colors.	nent of solu vironment : , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> PO <sub>7</sub> et; 3 – Stro et; 3 – Stro et; 3 – Stro et; 3 – Stro tion, graph ciples of u h compute n speeds, u nning and - screen : - focus an trieval on trieval selection ext xt and mes	PO <sub>8</sub> PO <sub>8</sub> mg tion, imp tion, is tion, is t	PO9 PO9 2 cortance cal user em, Ch face. rtance nding b e, orga n and asis – itistical w, selec ons and	PO <sub>8</sub> - 1 PC PC PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Good c face erist man ss ju g sc – V ntati hics of de ease	PO PO PO desig desig desig char nctio reen isuall isuall isuall isuall isuall son ir - Tec vices s - N	- Individual
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conte Unit: 1	Aodern too D <sub>10</sub> - Commu PO <sub>1</sub> 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphid Interfa Design human Design orderin compo simply consid Windo screen colors, HCI in	PO <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction: In d design. cs, the c ce popul process conside ing: Des ng of sc sition – and mea eration i ws – New -based c uses pro the softw	engineer a ject mana ing of co PO4 2 2 Reason A brief oncept of larity, ch s – Hum eration, 1 sign goa creen da amount aningfull n interfa w and Na controls. oblems, o ware pro	$O_3$ - Design and socie agement a ourse our $PO_5$	n/develop ty, PO7- Er nd finance tcomes w PO6 Significar er Interfac of Screen manipula stics- Prin action wit nteraction reen pla content rmation reen mation reen schemes nents – te colors.	PO <sub>12</sub> - Life- ith program PO <sub>7</sub> PO <sub>7</sub> PO <sub>7</sub> et; <b>3 - Stro</b> ce - defini design. Th tion, graph ciples of u h compute n speeds, u nning and - screen trieval on selection ext and mes	PO <sub>8</sub> PO <sub>8</sub> routcom PO <sub>8</sub> routcom PO <sub>8</sub> routcom routco	PO9 PO9 PO9 2 ortance cal user em, Ch face. rtance nding b e, orga n and asis – tistical w, selec ons an engine	PO <sub>8</sub> - 1 PC PC PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Dio Orface erist man ss ju g sc - V ntati hics Dif de ease Itera	PO: PO: PO: desig desig - po ics, W char nctio reen isuall ion ir - Tec vices s - N ative o	- Individual
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conte Unit: 1 Unit: 2	Aodern too D <sub>10</sub> - Commu PO1 3 	I usage, P nication, PO2 2 2 2 2 1 Introdu of good graphie Interfa Design human Design orderin compo simply consid Windo screen colors, HCI in prototy	PO <sub>6</sub> - The o PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> PO <sub>3</sub> 2 1- uction: In d design cs, the c ce popul process a conside ing: Des ng of sc sition – and mea eration i ws – New -based c uses pro the softwyping De	PO4 PO4 PO4 2 2 Reason A brief oncept of larity, ch sign goa reen da amount aningfull n interfa w and Na controls. oblems, of ware pro-	$O_3$ - Design and socie agement a ourse our $PO_5$	n/develop ty, PO7- Er nd finance tcomes w PO6 Significar er Interfa- of Screen manipula stics- Prin action wite nteraction reen pla content rmation reen n. schemes hents - te colors. e software otyping in	PO <sub>12</sub> - Life- ith program PO <sub>7</sub> PO <sub>7</sub> PO <sub>7</sub> pt; 3 – Stro ce – defini design. Th tion, graph ciples of u h compute n speeds, u nning and - screen focus an trieval on selection ext and mes	PO <sub>8</sub> PO <sub>8</sub> routcom PO <sub>8</sub> rg tion, imp re graphic nical syst ser interi ers, impo understar purpose navigation ad empha web – sta of window ssages, Ic	nability, ing ies PO <sub>9</sub> 2 ortance cal user em, Ch face. rtance iding b e, orga n and asis – itistical w, select ons and engine cionale	PO <sub>8</sub> - 1 PC PC PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Dio Orface erist man ss ju g sc – V ntati hics of de rease Itera n rul	PO PO desig desig - po ics, W char nctio reen isuall ion ir - Tec vices s - N ative of les Pr	- Individual
Or team work, PC Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 2	Aodern too D <sub>10</sub> - Commu PO1 3 	I usage, P nication, PO2 2 2 2 2 Introdu of good graphie Interfa Design human Design orderin compo simply consid Windo screen colors, HCI in protot	PO <sub>6</sub> - The o PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> PO <sub>3</sub> 2 2 1- uction: In d design cs, the c ce popul process a conside ing: Des ng of sc sition – and mea eration i ws – New -based c uses pro the softy yping De	engineer ject mana ing of co PO4 2 2 2 <b>Reason</b> A brief oncept of larity, ch s – Hum eration, 1 sign goa reen da amount aningfull n interfa w and Na controls. oblems, of ware pro-	$O_3$ - Design and socie agement a ourse our $PO_5$	n/develop ty, PO7- Er nd finance tcomes w PO6 Significar er Interfa of Screen manipula stics- Prir action wit nteraction reen pla content rmation reen n. schemes nents - te colors. e software otyping in den rules	PO <sub>12</sub> - Life- ith program PO <sub>12</sub> - Life- ith program PO <sub>7</sub> <b>tr</b> ; <b>3 - Stro</b> <b>tr</b> ; <b>3 - Stro</b> <b>tr</b> ; <b>3 - Stro</b> <b>t</b> ; <b>5</b>	PO <sub>8</sub> PO <sub>8</sub> PO <sub>8</sub> routcom PO <sub>8</sub> routcom PO <sub>8</sub> routcom PO <sub>8</sub> routcom ro	nability, ing ies PO <sub>9</sub> 2 ortance cal user em, Ch face. rtance iding b e, orga n and asis – itistical w, selec ons and engine ionale patter	PO <sub>8</sub> - 1 PO PC PC PC PC PC PC PC PC PC PC PC PC PC	Ethic Dio Dio Dio Dio Good C face erist man ss ju g sc - V ntati hics Dif de ease Itera n rul aluat	PO PO PO desig - po ics, W char nctio reen isuall ion ir - Tec vices s - M ative o les Pr ion to	- Individual

		Multi-modal interaction
	Unit: 5	Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus: Getting the size right.
Exan	nination and Evalua	tion Pattern: It include both internal evaluation (30 marks) comprising two class sessional
exan	ns/ assignments/ qu	iz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
exan	nination.	
Text	Books:	
1	The essential guide	to user interface design, Wilbert O Galitz, Wiley Dream Tech.
2	Human – Compute	r Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
Refe	rence Books:	
1	Designing the user	interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2	Interaction Design	Prece, Rogers, Sharps. Wiley Dreamtech.

Course Co					Course '				Lee	cture		
MTCS215F	PET				Text Mi	<u> </u>			L	T P	Se	mester: II
Version: 1.2				e of App	<b>roval:</b> 161	th BoS 17-			4	0 0		
	Scheme						5	Scheme o				
	f Periods	: 60	Hrs.					Ν	laximu	m Score	:	100
Period	s/ Week	: 4						Inte	rnal Ev	aluation	:	30
	Credits	: 4							End Se	emester	:	70
Instructi	on Mode	: Lec	ture						Exam E	Duration	:	3 Hrs.
Prerequisite(s)	Artificial	Intellige	nce									
Course Objecti	ves:											
1.												
Course Outcon	nes (CO):											
COs No.	. /				Statem	ent				Ma	pped	Program
												es (POs)
CO <sub>1</sub>	Define d	ata and t	ext mini	ng conce	epts and	technique	es					<b>PO</b> <sub>2</sub>
					-		ocessing t	ho data h	oforo			<b>PO</b> <sub>3</sub>
	mining	onection	i oi uata		iniques i	or pre-pr	ocessing t	ne uata D	elore		PO <sub>2</sub>	FU3
<u> </u>	0	a data a	ndtout	mining	a dala ta	a alva pro	hlomahri	tra atina	~		DO	DO
CO <sub>3</sub>	knowled			nnnng n	ioueis to	solve pro	blems by e	extracting	3		<b>PU</b> 4	<b>PO</b> 5
<u> </u>							1	. 1.1.1.		D(	<u> </u>	
CO <sub>4</sub>	2	1		ion of da	ia and te	ext inining	technique	s which		PC	J4, PO	$O_9, PO_{10}$
	appropri					(1, 1,			0 1			C 1
PO <sub>1</sub> - Engineering	Knowledg	e, <b>PO</b> 2- Pi	roblem an	halysis, PC	<b>)</b> <sub>3</sub> - Design	1/developr	nent of solu	tions, <b>PO</b> 4	- Condu	ct investig	gations	of comple
problems, <b>PO</b> <sub>5</sub> - M or team work, <b>PO</b>										PO <sub>8</sub> - Ethio	cs, PO	- maiviau
of team work, PC	10 <sup>-</sup> Commu	meation,					th program					
Course			марр	ning of CC	Juise out	LCOMES WI	iui prograi		les			
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO	
Outcomes			-			-			_			
CO <sub>1</sub>	3	2										
CO <sub>2</sub>		2	2									
CO <sub>3</sub>				2	2							
CO <sub>4</sub>				2					2	3		
			1 -	Reason	able; 2 – 1	Significan	nt; 3 – Stro	ng				
<b>Detailed</b> Conte	nts:							0				
		Introd	uction of	f Text M	ining an	d Text mi	ning applic	cation. Da	ata Min	ing Tren	ds an	1 Researc
Unit: 1					0		ta Pre-pro			0		
							n Tree Inc		Rule-Ba	sed Clas	sificat	ion Bave
				lethods.	-	Decision	ii iice iiic	iuction, i	ture Du	sea elas	Sincu	lon, buye
Unit: 2						orization	algorithms	s Naive B	aves k-	Nearest	Neiơł	bor (kNN
01110. 2							lachines a					
							ion matrix			CC3. 110	nuativ	
Unit: 3			-				nd Correla			oonta ond	Mot	ande
Unit. 5							thods and					
I Instein A												
Unit: 4							.a., hierar					
							uation of te					
Unit: 5							Categoriza				tion	Extraction
							ilistic and					
Examination a												
exams/assignr	nents/ qu	iz/ sem	inar pres	sentation	n etc. and	l external	evaluation	n (70 mark	ks) whic	h is main	ly en	d semeste
examination.												
Text Books:												
1 Ronen F	eldman;	James S	Sanger.	(2007).	The tex	t mining	g handboo	ok: advar	nced a	pproache	es in	analyzin
unstructu	ıred data.	01. Cam	bridge U	niversity	Press. N	Jew York.	ISBN: 978-	-0-12-381	479-1.			-
2												
Reference Bool	ks:											
			- ( (-)	D . 10						-	D 11	1 0
1 Han, J., K					ning: Coi	ncepts an	d Techniqu	1e. 03. Mc	organ K	aufmann	Publi	shers. Sar
1 Han, J., K	amber, M. b. ISBN: 97				ning: Coi	ncepts an	d Techniqu	1e. 03. Mc	organ K	aufmann	Publi	shers. Sar

Course Code		Course Title							Leo	eture	re			
MTCS221P	PET		0			d Virtual I			L	Т Р	Se	mester:		
Version: 1.2	Date of Approval: 16th								ů					
	Scheme							Scheme	of Exam		1	10.0		
No. of Periods Periods/Week			Hrs.					Ind		im Score	:	100		
Period	s/ week Credits	: 4	: 4			Internal Evalu End Sem						30 70		
Instruction Mode		· -	cture							Duration	•	3 Hrs.		
Prerequisite(s):									Елапп	Duration	·	51115.		
Course Objectiv		intelliger	lee											
1. To understa		sic conc	ept and f	ramewo	rk of virt	ual reality	v.							
2. To understa								tual and	augmen	ted realit	y syst	ems.		
3. To explore t	the resear	ch issues	s in Augn	nented R	leality ar	d Virtual	Reality (A	R &VR).	-					
4. To Understa		vironme	nts.											
<b>Course Outcom</b>	es (CO):													
COs No.		Statement									Mapped Program			
										Outcomes (POs)				
CO1				ness in Augmented Reality and Virtual Reality (AR&VR).PO1, PO2, PO3Cation of VR and AR technologies in various area likePO1, PO2, PO5										
$CO_2$	education			ation of	VR and	AR techr	lologies ii	n variou	s area n	ке Р	O <sub>1</sub> , P	$\mathbf{O}_2, \mathbf{PO}_2$		
CO <sub>3</sub>		<u> </u>		rtance c	fVR & AI	? in the m	odern wo	rld		D	)° D	04, PO		
CO <sub>4</sub>							nd the ch		faced			PO <sub>12</sub>		
<b>PO</b> <sub>1</sub> - Engineering										ict investi				
problems, PO5- M	lodern tool	usage, P	<b>3</b> 6- The e	ngineer a	nd societ	y, <b>PO</b> 7- Env	vironment	and susta	ainability,					
or team work, PO	10- Commu	nication, l												
		r	Mappi	ing of co	urse out	comes wi	th progra	m outco	mes	1	1			
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	$PO_6$	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PC	11 PC		
Outcomes	2	2	3											
CO <sub>1</sub> CO <sub>2</sub>	3	2	3		2									
CO <sub>2</sub>	5	2	1	2	2				2					
CO4		2	1						-			2		
	I		1 -	Reasona	ble; 2 – S	Significan	t; 3 – Stro	ng						
Detailed Conter	nts:				·	0 0		0						
Unit: 1		Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality.												
Onit. I		Primary Features and Present Development on Virtual Reality.												
	Unit. 2		Multiple Models of Input and Output Interface in Virtual Reality: Input Tracker, Sensor Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output											
Unit: 2		0			-		based Inp	out, 3D M	Menus &	3DScanr	er et	e. Outpu		
					tic Devic		undament	alg of C	omputo	r Craphi		ftwara		
Unit: 3							isplay. Adv							
enit. e						al Time Re		, uneed 1	coninqu		Ivitari	gemen		
							y: Body 🛛	Frack, H	land Ge	sture, 3D	Mar	us, Obj		
		Grasp.	Develop	oment T	ools and	ł Framew	orks in V	Virtual I	Reality:	Framewo	rks o	f Softwa		
Unit: 4		Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools etc. Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR Technology in Physical												
		Digital									ology	in Physi		
			1.0	amer D	emonstr	ation of L	Digital Ent	ertainme						
		Exercis	es and C		Dealiter	<b>T</b> aa <b>a a a</b>	to also	1	d footer			en real		
		Exercis Augme	nted and	d Mixed			ny, techno lenges w							
		Exercis Augme differen	nted and nce bet	d Mixed ween A	R and	VR, Chall	lenges w	ith AR,	AR sys	stems ar	d fu	nctional		
Unit: 5		Exercis Augme differen Augme	nted and nce bet nted rea	d Mixed ween A lity meth	R and visu	VR, Chall Jalization	lenges w technique	ith AR, es for au	AR sys	stems ar d reality,	d fu wirele	nctional ss displa		
Unit: 5		Exercis Augme differen Augme in edu	nted and nce bet nted rea cational	1 Mixed ween A lity meth augmen	R and T lods, visu lted real	VR, Chall ualization ity applic	lenges w	ith AR, es for au nobile p	AR sys gmentee rojectior	stems ar d reality, n interfae	d fu wirele ces, n	nctional ess displa narker-l		
Unit: 5		Exercis Augme differen Augme in edu	nted and nce bet nted rea cational g for au	1 Mixed ween A lity meth augmen	R and T lods, visu lted real	VR, Chall ualization ity applic	lenges w technique cations, n	ith AR, es for au nobile p	AR sys gmentee rojectior	stems ar d reality, n interfae	d fu wirele ces, n	nctional ess displa narker-l		
Examination an	nd Evalua	Exercis Augme differen Augme in edu trackin system tion Pat	nted and nce bet nted rea cational g for au s. <b>tern:</b> It	d Mixed ween A lity meth augmen gmenteo include	R and real nods, visu ted real l reality, both int	VR, Chall alization ity applic enhancir ernal eva	lenges w technique cations, n ng interac luation (3	ith AR, es for au nobile p ctivity in 0 marks	AR sys gmented rojection AR env s) comp	stems ar d reality, n interfac ironment rising two	d fu wirele ces, n s, eva	nctional ess displa narker-l iluating s sessio		
<b>Examination ar</b> exams/ assignm	nd Evalua	Exercis Augme differen Augme in edu trackin system tion Pat	nted and nce bet nted rea cational g for au s. <b>tern:</b> It	d Mixed ween A lity meth augmen gmenteo include	R and real nods, visu ted real l reality, both int	VR, Chall alization ity applic enhancir ernal eva	lenges w technique cations, n ng interac luation (3	ith AR, es for au nobile p ctivity in 0 marks	AR sys gmented rojection AR env s) comp	stems ar d reality, n interfac ironment rising two	d fu wirele ces, n s, eva	nctional ess displa narker-l iluating s sessio		
<b>Examination ar</b> exams/ assignm examination.	nd Evalua	Exercis Augme differen Augme in edu trackin system tion Pat	nted and nce bet nted rea cational g for au s. <b>tern:</b> It	d Mixed ween A lity meth augmen gmenteo include	R and real nods, visu ted real l reality, both int	VR, Chall alization ity applic enhancir ernal eva	lenges w technique cations, n ng interac luation (3	ith AR, es for au nobile p ctivity in 0 marks	AR sys gmented rojection AR env s) comp	stems ar d reality, n interfac ironment rising two	d fu wirele ces, n s, eva	nctional ess displa narker-l iluating s sessio		
Examination ar exams/assignm examination. Text Books:	<b>nd Evalua</b> nents∕qu	Exercis Augme differen Augme in edu trackin system tion Pat iz/ semi	nted and nce bet nted rea cational g for au s. <b>tern:</b> It nar pres	d Mixed ween A lity meth augmen gmented include entation	R and nods, visu ted real l reality, both int etc. and	VR, Chall ualization ity applic enhancir ernal eva external	lenges w technique cations, n ng interac luation (3 evaluation	ith AR, es for au nobile p etivity in 0 marks n (70 ma	AR sys gmented rojection AR env s) compu rks) which	stems ar d reality, n interfac ironment rising two ch is main	id fu wirele ces, n s, eva o clas hly en	nctional ess displa narker-l iluating s sessio		
<b>Examination ar</b> exams/ assignm examination.	<b>nd Evalua</b> nents/ qu G. C. and P	Exercis Augme differen Augme in edu trackin system tion Pat iz/ semi	nted and nce bet nted rea cational g for au s. <b>tern:</b> It nar pres Virtual R	d Mixed ween A lity meth augmen gmented include entation reality Te	R and real nods, visu ted real l reality, both int etc. and echnolog	VR, Chall ualization ity applic enhancir ernal eva external y, Second	lenges w technique cations, n ng interac luation (3 evaluation	ith AR, es for au nobile p etivity in 0 marks n (70 mar Wiley-IE	AR sys gmented rojection AR env s) compu- rks) white EEE Press	stems ar d reality, in interfaction ironment rising two ch is main s, 2003/2	d fu wirele ces, n s, eva o clas oly en	nctional ess displa narker-l iluating s sessio		

2 Gerard Jounghyun Kim, Designing Virtual Systems: The Structured Approach, 2005.

1

Course Coo	le										Lecture			
MTCS222PI			Patterr			bject Rec	cognition		L	Т	Р	Sem	ester: II	
Version: 1.2					0		BoS 17-11-2022 3				0			
	Scheme	of Instru				Scheme of Exam					n			
No. of	Periods		Hrs.			Maximu					ore	:	100	
Periods	/ Week	: 4				Internal Ev							30	
	Credits	: 3							End S	Semester : 70			70	
Instructio	n Mode											3 Hrs.		
Prerequisite(s): N	lathemat	ics and M	Machine	Learning	g									
Course Objective					<u> </u>									
. To understan		ic conce	pt of pat	tern rec	ognition	•								
2. To equip with							ttern reco	ognition.						
3. To acquire th	e techniq	ue to de	velop ma	achine le	earning a	lgorithms	for real	world pro	blems.					
4. To apply patt								-						
Course Outcome	s (CO):	<u>.</u>												
COs No.	/			S	Statemer	nt						oed Pro		
CO <sub>1</sub>	Understa	and the	concep	tofa	pattern	and the	basic ap	proach 1	to the			PO <sub>1</sub>		
	developm	nent of	pattern	recogni	tion and	machine	e intellige	ence algo	rithms					
	and appli	ications	of PR sys	stem.				-						
CO <sub>2</sub>	Demonst	rate the	basic m	ethods of	of featur	e extracti	ion, featu	re evalua	tion,		J	PO <sub>2</sub> , PC	4	
	analyze a	nd relat	e researe	ch in the	pattern	recogniti	on area.							
CO <sub>3</sub>					pervised	classifica	tion metl	nods to d	evelop	PO <sub>3</sub> , PO <sub>5</sub> , PO <sub>9</sub>				
CO <sub>4</sub>	2	m in real-world data. pattern recognition techniques to real-world problems such as											PO <sub>5</sub>	
			pattern recognition techniques to real-world problems such as PO <sub>3</sub> , PO <sub>4</sub> , PO <sub>5</sub> etection and recognition and to implement simple pattern											
	object d	letectior	n and 1	recogniti	ion and		lement	simple p	attern					
<b>PO</b> 1- Engineering K	object c classifier nowledge,	letectior s, classif <b>PO</b> 2- Pro	n and 1 fier comb oblem ana	recogniti oinations lysis, <b>PO</b> 3	ion and s, and str - Design/	to imp ructural pa /developm	olement attern rec ent of solu	simple p cognizers itions, <b>PO</b> 4	attern - Condu					
<b>PO₁-</b> Engineering K problems, <b>PO₅-</b> Mo	object c classifier nowledge, dern tool u	letectior <u>s, classif</u> <b>PO</b> 2- Pro 1sage, <b>PO</b>	n and r fier comb oblem ana 06- The en	recogniti <u>pinations</u> lysis, <b>PO</b> 3 ngineer ar	ion and s, and str - Design, nd society	to imp ructural pa /developm 7, <b>PO</b> 7- Env	olement attern rec ent of solu rironment	simple p cognizers itions, <b>PO</b> 4 and sustaii	attern - Condu nability, 1					
<b>PO</b> 1- Engineering K problems, <b>PO</b> 5- Mo	object c classifier nowledge, dern tool u	letectior <u>s, classif</u> <b>PO</b> 2- Pro 1sage, <b>PO</b>	n and 1 <u>fier comb</u> oblem ana <b>0</b> 6- The en <b>10</b> 11- Proje	recogniti <u>pinations</u> lysis, <b>PO</b> 3 ngineer ar ect manag	ion and s, and str - Design nd society gement an	to imp ructural pa /developm /, <b>PO</b> 7- Env d finance,	olement attern ree ent of solu ironment <b>PO</b> 12- Life-	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr	attern - - Condu nability, I					
<b>PO1-</b> Engineering K problems, <b>PO</b> 5- Mo or team work, <b>PO1</b> 0	object c classifier nowledge, dern tool u	letectior <u>s, classif</u> <b>PO</b> 2- Pro 1sage, <b>PO</b>	n and 1 <u>fier comb</u> oblem ana <b>0</b> 6- The en <b>10</b> 11- Proje	recogniti <u>pinations</u> lysis, <b>PO</b> 3 ngineer ar ect manag	ion and s, and str - Design nd society gement an	to imp ructural pa /developm 7, <b>PO</b> 7- Env	olement attern ree ent of solu ironment <b>PO</b> 12- Life-	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr	attern - - Condu nability, I					
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> -	object c classifier nowledge, dern tool u	letectior <u>s, classif</u> <b>PO</b> 2- Pro 1sage, <b>PO</b>	n and 1 <u>fier comb</u> oblem ana <b>0</b> 6- The en <b>10</b> 11- Proje	recogniti <u>pinations</u> lysis, <b>PO</b> 3 ngineer ar ect manag	ion and s, and str - Design nd society gement an	to imp ructural pa /developm /, <b>PO</b> 7- Env d finance,	olement attern ree ent of solu ironment <b>PO</b> 12- Life-	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr	attern - - Condu nability, I		thic		Individua	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> Course Outcomes	object of classifier nowledge, dern tool u Commun	letectior s, classif PO2- Pro 1sage, PO ication, P	n and 1 <u>fier comb</u> oblem ana 06- The en 011- Proje Mappin	recognitions of the second state of the second	ion and s, and str - Design nd society ement an irse outc	to imp ructural pa /developm v, <b>PO</b> 7- Env d finance, comes wit	olement attern red ent of solu ironment <b>PO</b> 12- Life- h program	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr m outcom	attern - Condu nability, I ning nes	<b>РО</b> 8- Е	thic	s, <b>PO</b> 9-	Individua	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> - Course Outcomes CO <sub>1</sub>	object of classifier nowledge, dern tool u - Commun	letectior s, classif PO <sub>2</sub> - Prc usage, PO ication, P PO <sub>2</sub>	n and 1 <u>fier comb</u> oblem ana 06- The en 011- Proje Mappin	recogniti Dinations lysis, <b>PO</b> agineer ar act manag ng of cou <b>PO</b> 4	ion and s, and str - Design nd society ement an irse outc	to imp ructural pa /developm v, <b>PO</b> 7- Env d finance, comes wit	olement attern red ent of solu ironment <b>PO</b> 12- Life- h program	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr m outcom	attern - Condu nability, I ning nes	<b>РО</b> 8- Е	thic	s, <b>PO</b> 9-	Individua	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> . Course Outcomes CO <sub>1</sub> CO <sub>2</sub>	object of classifier nowledge, dern tool u Commun	letectior s, classif PO2- Pro 1sage, PO ication, P	n and n fier comb oblem ana 06- The er O11- Proje Mappin PO3	recognitions of the second state of the second	ion and str - Design - Design d society ement an 17Se outco PO5	to imp ructural pa /developm v, <b>PO</b> 7- Env d finance, comes wit	olement attern red ent of solu ironment <b>PO</b> 12- Life- h program	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr m outcom	- Condu - Condu nability, 1 ning nes <b>PO</b> 9	<b>РО</b> 8- Е	thic	s, <b>PO</b> 9-	Individua	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub>	object of classifier nowledge, dern tool u Commun	letectior s, classif PO <sub>2</sub> - Prc usage, PO ication, P PO <sub>2</sub>	n and n fier comb oblem ana 0 <sub>6</sub> - The en O <sub>11</sub> - Proje Mappin PO <sub>3</sub> 2	recogniti Dinations lysis, <b>PO</b> <sub>3</sub> ngineer ar ect manag ng of cou <b>PO</b> <sub>4</sub> 1	ion and str - Design, - Design, d society ement an 1rse outco PO5 2	to imp ructural pa /developm v, <b>PO</b> 7- Env d finance, comes wit	olement attern red ent of solu ironment <b>PO</b> 12- Life- h program	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr m outcom	attern - Condu nability, I ning nes	<b>РО</b> 8- Е	thic	s, <b>PO</b> 9-	Individua	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> . Course Outcomes CO <sub>1</sub> CO <sub>2</sub>	object of classifier nowledge, dern tool u Commun	letectior s, classif PO <sub>2</sub> - Prc usage, PO ication, P PO <sub>2</sub>	n and n fier comb bblem ana bblem ana bblem ana bblem ana oblem ana oblem ana bblem and bblem and bblem ana bblem ana bblem and bblem an	recogniti pinations lysis, <b>PO</b> <sub>3</sub> ngineer ar ect manag ng of cou <b>PO</b> <sub>4</sub> 1 1	ion and s, and str - Design/ nd society rement an urse outco PO5 2 2	to imp ructural pa /developm d, <b>PO</b> 7- Env d finance, , comes wit <b>PO</b> 6	ent of solu ent of solu ironment PO <sub>12</sub> - Life- h program PO <sub>7</sub>	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr m outcom <b>PO</b> 8	- Condu - Condu nability, 1 ning nes <b>PO</b> 9	<b>РО</b> 8- Е	thic	s, <b>PO</b> 9-	Individua	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> - Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	letectior s, classif PO <sub>2</sub> - Prc usage, PO ication, P PO <sub>2</sub>	n and n fier comb bblem ana bblem ana bblem ana bblem ana oblem ana oblem ana bblem and bblem and bblem ana bblem ana bblem and bblem an	recogniti pinations lysis, <b>PO</b> <sub>3</sub> ngineer ar ect manag ng of cou <b>PO</b> <sub>4</sub> 1 1	ion and s, and str - Design/ nd society rement an urse outco PO5 2 2	to imp ructural pa /developm v, <b>PO</b> 7- Env d finance, comes wit	ent of solu ent of solu ironment PO <sub>12</sub> - Life- h program PO <sub>7</sub>	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr m outcom <b>PO</b> 8	- Condu - Condu nability, 1 ning nes <b>PO</b> 9	<b>РО</b> 8- Е	thic	s, <b>PO</b> 9-		
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> - Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	etectior s, classif PO <sub>2</sub> - Pro usage, PO ication, P PO <sub>2</sub> 2	n and n fier comb oblem ana 06- The en Mappin PO3 PO3 2 2 1 - 1	recogniti pinations lysis, <b>PO3</b> ngineer ar ect manag ng of cou <b>PO4</b> 1 1 Reasonal	ion and s, and str - Design/ nd society ement an urse outco PO5 2 2 2 2 ble; 2 – S	to imp ructural pa /developm v, PO7- Env d finance, ' comes wit PO6 ignificant	ent of solu ironment PO12- Life- h program PO7	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr n outcom <b>PO</b> 8 <b>ng</b>	Attern - Condu nability, ing ees <b>PO</b> 9	PO <sub>8</sub> - E PO	10	PO <sub>11</sub>	PO <sub>12</sub>	
PO1- Engineering K problems, PO5- Mo or team work, PO10 Course Outcomes CO1 CO2 CO3 CO4 Detailed Content	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	letectior s, classif PO <sub>2</sub> - Pro usage, PO ication, P PO <sub>2</sub> 2 2 Introdu	a and a and a $16 \text{ fier comb}$ below ana $26 \text{ - The end } 06 \text{ - The end } 06 \text{ - The end } 06 \text{ - Project } 06$	recogniti pinations lysis, <b>PO3</b> ngineer ar ect manag ng of cou <b>PO4</b> 1 1 <b>Reasonal</b> o Patter	ion and s, and str - Design/ nd society ement an urse outco PO5 2 2 2 2 2 2 2 2 5 1 2 2 5 1 2 2 5 1 2 2 1 2 5 1 7 7 8 7 7 7 7 8 7 7 7 7 7 7 7 7 7 7 7	to imp ructural pa /developm v, PO7- Env d finance, j comes wit PO6 ignificant	ent of solu ironment PO <sub>12</sub> - Life- h program PO <sub>7</sub> ; 3 – Stro	simple p cognizers itions, PO4 and sustain long Learr n outcom PO8 mg	Attern - Condu nability, ing ees PO <sub>9</sub> 1	POs- E PO	10 eet	PO <sub>11</sub>	PO <sub>12</sub>	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> - Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	letectior s, classif PO <sub>2</sub> - Pro Isage, PO ication, P PO <sub>2</sub> 2 2 Introdu classifi	a and a and a $16 \text{ er} \text{ comb}$ bblem ana $0_6$ - The en $0_{11}$ - Proje Mappin PO <sub>3</sub> 2 2 1 - 1 uction to ers-Deci	recogniti pinations lysis, <b>PO</b> <sub>3</sub> ngineer ar ect manag ng of cou <b>PO</b> <sub>4</sub> 1 1 <b>Reasonal</b> o Patter ision Tro	ion and s, and str - Design, nd society ement an irse outco PO5 2 2 2 2 ble; 2 - S cn Recogeees: CAF	to imp ructural pa /developm v, PO7- Env d finance, j comes wit PO6 ignificant gnition. T RT, C4.5,	element attern red ent of solu ironment PO <sub>12</sub> - Life- h program PO <sub>7</sub> () () () () () () () () () ()	simple p cognizers itions, PO4 and sustain -long Learr n outcom PO8 PO8 sifiers Go dom Fore	Attern - Condunability, J ing ees PO9 1 1 etting cests-Bay	POs- E PO	10 eet	PO <sub>11</sub>	PO <sub>12</sub>	
PO1- Engineering K problems, PO5- Mo or team work, PO10 Course Outcomes CO1 CO2 CO3 CO4 Detailed Content	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	etectior s, classif PO <sub>2</sub> - Pro isage, PO ication, P PO <sub>2</sub> 2 2 Introdu classifi Ground	a and a and a $\frac{1}{1}$ and a $\frac{1}{1}$ and	recogniti pinations lysis, <b>PO3</b> ngineer ar ect manag ng of cou <b>PO4</b> 1 1 <b>Reasonal</b> o Patter ision Tro inquiry-	ion and s, and str - Design/ nd society ement an irse outco PO5 2 2 2 ble; 2 - S cn Recog ees: CAF	to imp ructural pr /developm v, PO7- Env d finance, j comes wit PO6 ignificant gnition. T RT, C4.5, Discrimina	element attern red ent of solu ironment PO12- Life- h program PO7 PO7 Cree Class ID3 Ran ants Disc	simple p cognizers itions, PO4 and sustain long Learr n outcom PO8 pO8 sifiers Ge dom Fore riminative	attern - Condu aability, ing ees PO9 1 1 etting o ests-Bay e Classif	PO <sub>8</sub> - E PO	10 eet De	PO <sub>11</sub> PO <sub>11</sub> wet w ecision	PO12	
PO1- Engineering K problems, PO5- Mo or team work, PO10 Course Outcomes CO1 CO2 CO3 CO4 Detailed Content	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	Introdu Classifi PO <sub>2</sub> - Pro Usage, PO Ication, P PO <sub>2</sub> 2 2 Introdu Classifi Ground The Do	n and n fier comb oblem ana oblem ana oblem ana oblem ana oblem ana oblem ana oblem ana Mappin PO3 PO3 2 2 2 2 1 - 1 uction to ers-Deciding our ecision B	recogniti pinations lysis, <b>PO</b> <sub>3</sub> ngineer ar ect manag ng of cou <b>PO</b> <sub>4</sub> 1 1 <b>Reasonal</b> o Patter ision Tre inquiry- Boundary	ion and s, and str - Design/ nd society rement an irse outco PO5 2 2 2 2 2 5 1e; 2 – S cn Recoge ees: CAF Linear I y, Separa	to imp ructural pa /developm d finance, , comes wit PO <sub>6</sub> ignificant gnition. T RT, C4.5, Discrimina ability, Pe	PO12- Life- PO12- Life- h program PO7 PO7 PO7 PO7 PO7 PO7 PO7 PO7	simple p cognizers itions, PO4 and sustain long Learr moutcom PO8 sifiers Ge dom Fore riminative	attern - Condu hability, - ing ees PO <sub>9</sub> 1 - - - - - - - - - - - - -	POs- E PO pour fe vesian iers. r Mac	10 eet De	PO <sub>11</sub> PO <sub>11</sub> wet w ecision	PO12	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> - Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	Introdu classifi FO2- Pro usage, PO ication, P PO2 2 2 1 Introdu classifi Ground The Do Techni	n and n fier comb oblem ana oblem ana oblem ana oblem ana oblem ana oblem ana oblem ana polem ana polem ana polem ana polem ana polem ana polem ana polem ana polem ana oblem and oblem an	recogniti pinations lysis, PO3 agineer ar agineer ar agine of cou PO4 1 1 Reasonal o Patter ision Tra- inquiry- Boundary nerative	ion and s, and str - Design/ ind society rement an urse outco PO5 2 2 2 2 2 2 2 2 5 1e; 2 - S case: CAF Linear I y, Separa Methods	to imp ructural pa /developm d, <b>PO</b> 7- Env d finance, , comes wit <b>PO</b> 6 <b>ignificant</b> gnition. T RT, C4.5, Discrimina ability, Pe s grounde	Plement attern red ent of solu ironment PO12- Life- th program PO7 PO7 Cree Clas ID3 Ran ants Disc: erceptron ed in Baye	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr <b>n</b> outcom <b>PO</b> 8 sifiers G dom Fore riminative sian Deci	attern - Condu ability, - ing ees PO <sub>9</sub> 1 - etting of ests-Bay e Classift t Vecto sion Th	PO <sub>8</sub> - E PO	10 eet De	PO11 PO11 wet w ecision es, Par	PO <sub>12</sub> ith rea Theory	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> - Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	Introdu classifi PO2- Pro usage, PO ication, P PO2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	n and n ier comb oblem ana oblem ana obl	recogniti pinations lysis, PO3 rect manag ng of cou PO4 1 1 Reasonal o Patter ision Tra inquiry- Boundary nerative elihood	ion and s, and str - Design/ ind society ement an urse outco PO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	to imp ructural pa /developm v, <b>PO</b> 7- Env d finance, - comes wit <b>PO</b> 6 ignificant gnition. T RT, C4.5, Discrimina ability, Pe s grounde cion- Bay	Plement attern red ent of solu ironment PO12- Life- th program PO7 PO7 Cree Clas ID3 Ran ants Disc: erceptron ed in Baye	simple p cognizers itions, <b>PO</b> 4 and sustain long Learr <b>n</b> outcom <b>PO</b> 8 sifiers G dom Fore riminative sian Deci	attern - Condu ability, - ing ees PO <sub>9</sub> 1 - etting of ests-Bay e Classift t Vecto sion Th	PO <sub>8</sub> - E PO	10 eet De	PO11 PO11 wet w ecision es, Par	PO <sub>12</sub> ith real Theory	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> - Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1 Unit: 2 Unit: 3	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	Introdu classifi PO2- Pro usage, PO ication, P PO2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	h and h h and h h and h h b b lem and h b b b h b b b b b b b b b b b b b b	recogniti pinations lysis, PO3 ngineer ar set manag ng of cou PO4 1 1 Reasonal o Patter ision Tra- ision Tra- isoundary nerative elihood ernel De	ion and s, and str - Design/ ind society ement an urse outco PO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	to imp ructural pro- /developm /developm dinance, romes wit PO6 pof gnition. T RT, C4.5, Discrimina ability, Pe s grounde cion - Bay imators.	ent of solution of	simple p cognizers itions, PO4 and sustain long Learr n outcom PO8 sifiers Ge dom Fore riminative sian Deci arameter	Attern - Condu hability, - ing PO9 PO9 1 - etting of ests-Bay e Classif t Vecto sion Th Estim	PO <sub>8</sub> - E PO	10 eet De Chine	PO11 PO11 wet we ecision es, Par on-Par	Individu PO <sub>12</sub> ith rea Theory ametric	
PO1- Engineering K problems, PO5- Mo or team work, PO10 Course Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	Introdu classifi PO2- Pro usage, PO ication, P PO2 2 2 2 Introdu classifi Ground The Do Techni Maxim Techni Neares	n and n ier comb belem ana belem ana be- The en On- Projector Mappin PO3 PO3 PO3 PO3 PO3 PO3 PO3 PO3	recogniti pinations lysis, PO3 agineer ar act manag ng of cou PO4 1 1 Reasonal o Patter ision Tra ision Tra inquiry- Boundary nerative elihood ernel Der bour Ma	ion and s, and str - Design/ nd society ement an irse outco $PO_5$ 2 2 2 2 2 2 2 2	to imp ructural pr /developm /developm dinance, comes wit PO6 pof ignificant gnition. T RT, C4.5, Discrimina ability, Pe s grounde cion - Bay imators. - Unsupe	ent of solution of	simple p cognizers itions, PO4 and sustain long Learr n outcom PO8 mg sifiers Ge dom Fore riminative sian Deci arameter lethods F	Attern - Condu hability, - ing PO9 PO9 1 - etting of ests-Bay e Classif t Vecto sion Th Estim	PO <sub>8</sub> - E PO	10 eet De Chine	PO11 PO11 wet we ecision es, Par on-Par	Individu PO <sub>12</sub> ith rea Theory ametric	
PO <sub>1</sub> - Engineering K problems, PO <sub>5</sub> - Mo or team work, PO <sub>10</sub> - Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Content Unit: 1 Unit: 2 Unit: 3	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	Introdu classifi PO2- Pro Isage, PO ication, P PO2 2 2 2 Introdu classifi Ground The Do Techni Maxim Techni Neares Structu	n and n ier comb belem ana belem ana be- The en On- Proje Mappin PO3 PO3 PO3 PO3 PO3 PO3 PO3 PO3	recogniti pinations lysis, PO3 ngineer ar act manag ng of cou PO4 1 1 Reasonal co Patter ision Tra- ision Tra- ision Tra- inquiry- Boundary nerative elihood ernel Der bour Ma	ion and s, and str - Design, d society ement an irse outco $PO_5$ $PO_5$ 2 2 2 2 2 2 2 2 2 2 2 2 2	to imp ructural pa /developm v, PO <sub>7</sub> - Env d finance, j comes wit PO <sub>6</sub> ignificant gnition. T RT, C4.5, Discrimina ability, Pe s grounde cion - Bay imators. - Unsupe s and Dim	ervised M M M M M M M M M M M M M M	simple p cognizers utions, PO4 and sustain long Learr n outcom PO8 mg sifiers Ge dom Ford riminative sian Deci arameter lethods H eduction.	attern - Condu hability, J ing ees PO <sub>9</sub> 1 1 etting of ests-Bay e Classifi t Vecto sion Th Estim	PO <sub>8</sub> - E PO pur fe vesian iers. r Mac eory. ation. g the	eet De Chino N E Da	PO11 PO11 wet w ecision es, Par on-Par ata for	PO12 PO12 ith real Theory ametric ametric Latent	
PO1- Engineering K problems, PO5- Mo or team work, PO10 Course Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	Introduction PO2- Procusage, PO2- Isage, PO2-	n and n ier comb bblem ana bolem ana bolem ana bolem ana of the er On - Proje Mappin PO3 PO3 PO3 PO3 PO3 PO3 PO3 PO3	recogniti pinations lysis, PO3 ngineer ar act manag ng of cou PO4 1 1 Reasonal co Patter ision Tra- ision Tra- ision Tra- inquiry- Boundary- nerative elihood ernel Der bour Ma	ion and s, and str - Design, d society ement an irse outco $PO_5$ 2 2 2 2 2 2 2 2	to imp ructural pr /developm /developm /developm /rocomes wit PO6 PO6 ignificant gnition. T RT, C4.5, Discrimina ability, Pe s grounde cion - Bay imators. - Unsupe s and Dim Principal (	element attern red ent of solu ironment PO <sub>12</sub> - Life- h program PO <sub>7</sub> PO <sub>7</sub> Cree Class ID3 Ran ants Disc: erceptrom ed in Baye yesian P ervised M ension R Compone	simple p cognizers utions, PO4 and sustain -long Learr n outcom PO8 g sifiers Ge dom Fore riminative a, Support sian Deci arameter Lethods F eduction.	attern - Condu hability, j ing PO9 PO9 1 	PO <sub>8</sub> - E PO PO pur fe vesian iers. r Mac eory. ation. g the er Lir	eet Deet Na eet Na	PO <sub>11</sub> PO <sub>11</sub> wet w ecision es, Par on-Par ata for	Individu POn ith rea Theory ametric ametric Latent	
PO₁- Engineering K problems, PO₅- Mo or team work, PO₁₀- Course Outcomes CO₁ CO₂ CO₃ CO₄ Detailed Content Unit: 1 Unit: 2 Unit: 3	object of classifier nowledge, dern tool u - Commun PO <sub>1</sub> 2	Introdu classifi PO2- Pro Isage, PO ication, P PO2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	n and n Tier comb bblem ana bolem ana bolem ana bolem ana bolem ana bolem ana manual for any point Proje Mappin PO3 PO3 PO3 PO3 PO3 PO3 PO3 PO3	recogniti pinations lysis, PO3 ngineer ar rect manag ng of cou PO4 1 1 Reasonal o Patter ision Tro inquiry- Boundary nerative elihood ernel Der bour Mo mponent Dimensio Embedd	ion and s, and str - Design, id society ement an irse outco PO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	to imp ructural pr /developm /	Alement attern red ent of solution ironment PO12- Life- h program PO7 PO7 PO7 Cree Class ID3 Ran ants Disc: erceptromed in Baye yesian P ervised N tension Re Compone K-Means.	simple p cognizers itions, PO4 and sustain long Learr n outcom PO8 g sifiers G dom Fore riminative a, Support esian Deci arameter lethods H eduction. expectat	attern - Condu hability, j ing PO9 PO9 1 	PO <sub>8</sub> - E PO PO pur fe vesian iers. r Mac eory. ation. g the er Lir	eet Deet Na eet Na	PO <sub>11</sub> PO <sub>11</sub> wet w ecision es, Par on-Par ata for	Individua PO12 ith real Theory ametric ametric Latent	
PO₁- Engineering K problems, PO₅- Mo or team work, PO₁o Course Outcomes CO₁ CO₂ CO₃ CO₄ Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5	object of classifier nowledge, dern tool u Commun PO1 2 s:	Introdu classifi PO2- Pro Isage, PO Isage, PO Isage, PO Isage, PO Isage, PO 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	n and n ier comb belem ana belem ana be- The er On- Proje Mappin PO3 PO3 PO3 PO3 PO3 PO3 PO3 PO3	recogniti pinations lysis, PO3 agineer ar act manag ng of cou PO4 1 1 Reasonal o Patter ision Tra ision Tra ision Tra isoundary nerative elihood ernel Der bour Ma mponent Dimensio Embedd nbles, Ba	ion and s, and str - Design, nd society ement an irse outco PO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	to imp ructural pr /developm /	Alement attern red ent of solution ironment PO12- Life- h program PO7 PO7 PO7 PO7 PO7 PO7 PO7 PO7	simple p cognizers itions, PO4 and sustain long Learr n outcom PO8 sifiers Ge dom Fore riminative sian Deci arameter lethods F eduction. int Analys Expectat st.	attern - Condu ability, ing ees PO9 1 1 etting c ests-Bay e Classif t Vecto sion Th Estim Explorin	PO <sub>8</sub> - E PO PO PO PO FO PO FO FO FO FO FO FO FO FO FO FO FO FO FO	thic:	s, PO <sub>9</sub> - PO <sub>11</sub> PO <sub>11</sub> exection es, Par on-Par ata for Discri n, Mea	Individua PO12 PO12 ith real Theory ametric ametric Latent minant, n Shift	
PO1- Engineering K problems, PO5- Mo or team work, PO10 Course Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and	object of classifier nowledge, dern tool of Commun PO <sub>1</sub> 2 s:	Introduction PO2- Procusage, PO ication, P PO2- PO2 PO2 PO2 PO2 PO2 PO2 PO2 PO2	n and n ier comb blem ana blem an	recogniti pinations lysis, PO3 agineer ar set manag ng of cou PO4 1 1 Reasonal o Patter ision Tra inquiry- Boundary nerative elihood ernel Der bour Ma mponent Dimensio Embedd nbles, Ba nclude b	ion and s, and str - Design/ ind society ement an irse outco PO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	to imp uctural pa /developm y, PO <sub>7</sub> - Env d finance, comes wit PO <sub>6</sub> ignificant gnition. T RT, C4.5, Discrimina ability, Pe s grounde cion- Bay imators. - Unsupe s and Dim Principal Q stering, H Goosting / ernal eval	ent of solution of	simple p cognizers ttions, PO4 and sustain long Learr n outcom PO8 sifiers Ge dom Fore riminative sian Deci arameter lethods H eduction. ent Analys Expectat st. 0 marks)	attern - Condu hability, - ing PO <sub>9</sub> 1 - etting of ests-Bay e Classif t Vecto sion Th Estim Explorin sis, Fish cion Ma compri	PO <sub>8</sub> - E PO PO PO PO PO FO PO FO PO FO PO FO FO FO FO FO FO FO FO FO FO FO FO FO	thic:	s, PO <sub>9</sub> - PO <sub>11</sub> PO <sub>11</sub> wet w ecision es, Par on-Par ata for Discri n, Mea class s	POn POn ith rea Theory ametric ametric Latent minant n Shift	
PO1- Engineering K problems, PO5- Mo or team work, PO10 Course Outcomes CO1 CO2 CO3 CO4 Detailed Content Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5	object of classifier nowledge, dern tool of Commun PO <sub>1</sub> 2 s:	Introduction PO2- Procusage, PO ication, P PO2- PO2 PO2 PO2 PO2 PO2 PO2 PO2 PO2	n and n ier comb blem ana blem an	recogniti pinations lysis, PO3 agineer ar set manag ng of cou PO4 1 1 Reasonal o Patter ision Tra inquiry- Boundary nerative elihood ernel Der bour Ma mponent Dimensio Embedd nbles, Ba nclude b	ion and s, and str - Design/ ind society ement an irse outco PO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	to imp uctural pa /developm y, PO <sub>7</sub> - Env d finance, comes wit PO <sub>6</sub> ignificant gnition. T RT, C4.5, Discrimina ability, Pe s grounde cion- Bay imators. - Unsupe s and Dim Principal Q stering, H Goosting / ernal eval	ent of solution of	simple p cognizers ttions, PO4 and sustain long Learr n outcom PO8 sifiers Ge dom Fore riminative sian Deci arameter lethods H eduction. ent Analys Expectat st. 0 marks)	attern - Condu hability, - ing PO <sub>9</sub> 1 - etting of ests-Bay e Classif t Vecto sion Th Estim Explorin sis, Fish cion Ma compri	PO <sub>8</sub> - E PO PO PO PO PO FO PO FO PO FO PO FO FO FO FO FO FO FO FO FO FO FO FO FO	thic:	s, PO <sub>9</sub> - PO <sub>11</sub> PO <sub>11</sub> wet w ecision es, Par on-Par ata for Discri n, Mea class s	POn POn ith rea Theory ametric ametric Latent minant n Shift	

Text	BOOKS.
1	Duda, Hart and Stork, Pattern Classification, Second Edition, Wiley, 2001.
2	Pattern Recognition principles: Julus T. Tou and Rafel C. Gonzalez, Addision –Wesley
Refe	rence Books:
1	S. Theodoridis, K. Koutroumbas, Pattern Recognition, Academic Press, 1999
2	Pattern recognition and machine learning, Christopher M. Bishop, Springer 2006

Course C					Course '				Le	ecture			
MTCS223	PET		_		omputer				L	Т	Р	Sem	ester: II
Version: 1.2	. 1			e of App	<b>roval:</b> 161	h BoS 17-		~ 1	4	0	0		
NT-		of Instr					2	Scheme o					00
	of Periods ls/Week		Hrs.							im Sco			100 30
Period	Credits	:     4     Internal Evalua       :     4     End Seme										70	
Instruct	ion Mode		: 4 End Seme : Lecture Exam Dura									3 Hrs.	
Prerequisite(s				ear Algel	ara Vect	or Calculi	us Data Sti						51115.
Course Object		menge	nee, Lin	cal Aigei			us, Data St	uctures a		Jgrann	ع	5.	
		ith both	the theo	retical a	nd practi	cal aspec	ts of comp	uting wit	h imag	es.			
							surement, a						
							iges and th						
	sp the prin												
Course Outcon	nes (CO):												
COs No.					Statem	ent					Maj	pped F	rogram
													s (POs)
CO <sub>1</sub>	-		-	erminol	ogy, theo	ories, moo	iels and m	ethods in	the fi	eld		<b>PO</b> 1, 1	PO <sub>2</sub>
	of comp									_			
CO <sub>2</sub>							n related					$\mathbf{PO}_2$ ,	PO <sub>3</sub>
	representation, edge detection and detection of other primitives, stereo, motion and object recognition.							eo,					
						1		1				DO	
CO <sub>3</sub>	-	-			Ũ		mputer visi					<b>PO</b> <sub>4</sub> ,	
CO <sub>4</sub>		0	exposure	e to obje	ect and s	scene rec	cognition a	ind categ	orizati	on	PO	94, PO	9, <b>PO</b> 10
PO1- Engineerin	from ima		roblom ar	obvoic D	De- Dogior	/dovolopy	mont of colu	tions DO.	- Cond	uct invo	oction	ations	of comploy
problems, <b>PO</b> <sub>5</sub> -1													
or team work, P										100 1		., - 05	mainada
							ith prograr						
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	РО	10	<b>PO</b> <sub>11</sub>	PO <sub>12</sub>
Outcomes			103	104	103	100	10/	10.	105	10	10	101	1012
CO <sub>1</sub>	3	2											
CO <sub>2</sub>		2	2	-									
CO3				2	2		-		0	0			
CO <sub>4</sub>				-	11.0	a	(		2	3			
D.4.1.1.0			1-	- Reason	able; 2 – 1	Significar	nt; 3 – Stro	ng					
Detailed Conte	ents:	Ouromai		nuton in	a din d at	atoma lo	nses, Imag	o formati	ion on	daana	ind	Imaga	opolygia
Unit:	1					e analysis		e iormau		u sens	mg,	image	analysis
		Edge	detectio	n Edo	e detec	tion per	,. formance,	Hough	trans	form	cor	ner (	letection
Unit: 2	2	Segme	ntation.	Morphol	logical fil	tering. Fo	ourier trans	sform	ci uno	.01111,	001		leteetion
T T *4 . 4	<b>.</b>						olor, spect		ure, us	sing C	V IP	tools	, Feature
Unit: 3	3						rity measu						
							K-Medoio						
Unit: 4	1				-		upervised,	-				•	
							PCA, LDA, I						ls.
Unit: S							mputationa						
Examination a													
exams/ assign	ments/ qu	uz/ sem	inar pres	sentation	n etc. and	ı external	evaluation	n (70 mark	ks) whi	ch is n	nainl	y end	semester
examination.													
Text Books:	er Vision: A	laoritha	ac and A	nnligatio	ng by Di	phard Sza	licki						
							nce, Prent	ice Hall D	obot V	ision 1	NV P	KD	Horn
2 Compute McGraw		A moue	п аррго	acii, by I	J.FUI SYLI	1 anu J.PO	nce, rieilt			151011, 1	ју Б.	. п. г.	10111,
Reference Boo													
	ry of Com	outer Vis	sion and	Image P	rocessing	v. by Fishe	er et al						
							e MIT Press	S.					
- Imee D		- compu		, ~, ~, 01		5 40, 110							

Course						Course '					cture	-	~	
MTCS22	4PET		L								Т 0			
Version: 1.2	Cabar	f	Teo and an	Uction	e of App	roval: 161	th Bos 1/-		<b>1-1</b>	-	-	0		
No	of Period	-							Scheme of	l Exam laximu				100
	ods/Wee		:     60 Hrs.     Maximum S       :     4     Internal Evalu       :     4     End Sem										30	
FCIR	Credit												<u> </u>	
Instruc	tion Mod		-	ture						Exam I				3 Hrs.
Prerequisite(											Juiatio		·	51115.
Course Objec			einge	1100										
		ploy	AI sys	stems th	at are re	eliable, tr	ustworth	y, and sec	ure, while	e minim	izing	the	risk o	of harm t
humans a			5			,		5,	,		0			
2. To involv	e address	ng is	sues s	such as t	oias, priv	acy, tran	sparency	, accounta	bility, and	the ro	bustne	ess	of AI s	systems.
3. To ensu	re that .	AI sy	stem	s perfor	rm as i	ntended	, consist	ently and	accurate	ely, in	differ	rent	con	texts an
environm														
			t can l	be truste	ed to ope	erate ethi	ically, trai	nsparently,	and with	integri	ity.			
Course Outco	omes (CO)													
COs No.						Statem	ent							Program
				1 11	. ^	1 1 .				, ,	1	Ou		es (POs)
CO <sub>1</sub>			0	ne challe	nges of	developi	ng Al sys	tems that	can opera	ate safe	Iy		<b>PO</b> <sub>1</sub> ,	<b>PO</b> 2
	and re			a a 16 - 14 1	4h a - 41	:	idaacti-	a tarre 1 - 1		1	-			DO
$CO_2$								s involved sparency.	III AI deve	eiopme	IIL		<b>PO</b> <sub>2</sub> ,	PU3
CO <sub>3</sub>								ng AI system	ma to ona	uro the	ir		<b>PO</b> <sub>4</sub> ,	DO-
$CO_3$	reliabi					esting an	iu veriryii	ig Ai syste		uie uie	.11		<b>гО</b> <sub>4</sub> ,	FU5
CO <sub>4</sub>					bne le	regulat	tory fra	neworks	surround	ling th	1e	PC	), P(	<b>D</b> <sub>9</sub> , <b>PO</b> <sub>10</sub>
004						AI system			Surround	ing u	IC .	10	, I C	<b>9</b> , <b>1 0</b> 10
problems, <b>PO</b> 5- or team work, <b>I</b>	Modern t	ol us	age, <b>P</b>	O <sub>6</sub> - The e PO <sub>11</sub> - Pro	engineer a ject mana	and societ agement a	ty, <b>PO</b> 7- En nd finance		and sustair long Learn	nability, ing				
problems, PO <sub>5</sub> - or team work, I Course	Modern t	ool us nunic	age, <b>P</b>	O <sub>6</sub> - The e PO <sub>11</sub> - Pro	engineer a ject mana	and societ agement a	ty, <b>PO</b> 7- En nd finance	ivironment a , <b>PO</b> 12- Life-	and sustair long Learn	nability, ing		Ethic		- Individua
problems, PO5- or team work, H Course Outcomes	Modern to 2010- Comi	ool us nunic	age, <b>P</b> ation, <b>PO</b> 2	06- The e PO11- Pro Mapp	engineer a ject mana ing of co	and societ agement a ourse out	ty, <b>PO</b> 7- En nd finance tcomes w	vironment a , <b>PO</b> 12- Life- ith program	and sustair long Learn n outcom	nability, ing es	<b>PO</b> 8- E	Ethic	es, <b>PO</b> 9	- Individua
problems, PO <sub>5</sub> - or team work, I Course	PO10- Com	ool us nunic	age, <b>P</b> ation,	06- The e PO11- Pro Mapp	engineer a ject mana ing of co	and societ agement a ourse out	ty, <b>PO</b> 7- En nd finance tcomes w	vironment a , <b>PO</b> 12- Life- ith program	and sustair long Learn n outcom	nability, ing es	<b>PO</b> 8- E	Ethic	es, <b>PO</b> 9	- Individu
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub>	PO10- Com	ool us nunic	age, <b>P</b> ation, <b>PO</b> <sub>2</sub> 2	0 <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub>	engineer a ject mana ing of co	and societ agement a ourse out	ty, <b>PO</b> 7- En nd finance tcomes w	vironment a , <b>PO</b> 12- Life- ith program	and sustair long Learn n outcom	nability, ing es	<b>PO</b> 8- E	Ethic	es, <b>PO</b> 9	- Individu
problems, PO <sub>5</sub> - or team work, H Course Outcomes CO <sub>1</sub> CO <sub>2</sub>	PO10- Com	ool us nunic	age, <b>P</b> ation, <b>PO</b> <sub>2</sub> 2	0 <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub>	engineer a ject mana ing of co PO <sub>4</sub>	and societ agement a purse out PO5	ty, <b>PO</b> 7- En nd finance tcomes w	vironment a , <b>PO</b> 12- Life- ith program	and sustair long Learn n outcom	nability, ing es	<b>PO</b> 8- E	Ethic 10	es, <b>PO</b> 9	- Individu
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	Modern t PO10- Comr PO1 3	ool us nunic	age, <b>P</b> ation, <b>PO</b> <sub>2</sub> 2	06- The 6 PO11- Pro Mapp PO3 2	engineer a ject mana ing of co PO4 2 2	and societ agement a purse out PO5 2	y, PO7- Er nd finance ccomes w PO6	vironment a , <b>PO</b> 12- Life- ith program	and sustair long Learn n outcom PO <sub>8</sub>	PO9	PO <sub>8</sub> - E	Ethic 10	es, <b>PO</b> 9	- Individu
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	Modern t PO10- Comr PO1 3		age, <b>P</b> ation, <b>PO</b> <sub>2</sub> 2 2	06- The e PO11- Pro Mapp PO3 2 1 -	PO4 PO4 2 2 Reason	PO5 2 able; 2 – S	y, PO7- Er nd finance comes w PO6 Significar	vironment a , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> ut; 3 – Stro	and sustair long Learn n outcom PO <sub>8</sub> ng	PO9	PO <sub>8</sub> - E	Ethic	PO1	- Individua 1 <b>PO</b> 12
problems, PO5- or team work, F Course Outcomes CO1 CO2 CO3	Modern t PO10- Comr PO1 3	Ir	age, P ation, PO <sub>2</sub> 2 2 ntrodu	06- The e PO11- Pro Mapp PO3 2 1-	PO4 PO4 2 2 Reasond	PO5 2 able; 2 – S	y, PO7- Er nd finance comes w PO6 Significar	vironment a , <b>PO</b> 12- Life- ith program <b>PO</b> 7	and sustair long Learn n outcom PO <sub>8</sub> ng	PO9	PO <sub>8</sub> - E	Ethic	PO1	- Individua 1 <b>PO</b> 12
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	Modern t PO10- Comr PO1 3 tents:	Ir o	age, P ation, PO <sub>2</sub> 2 2 2 ntrodu bjectiv	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 1- 1.ction to ves of De	PO4 PO4 2 2 Reasona Dependab	PO5 able; 2 – S dable Al le AI.	y, PO7- Er nd finance comes w PO6 Significar	vironment a , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> ut; 3 - Stroy	and sustair long Learn n outcom PO <sub>8</sub> ng ers the b	PO9 2 assic co	PO <sub>8</sub> - E PO	Ethic	PO1	- Individua <b>PO</b> <sub>12</sub> nges, an
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	Modern t PO10- Comr PO1 3 tents:	Ir of A	age, P ation, PO <sub>2</sub> 2 2 2 ntrodu bjectir I Ethi	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 1 - uction to ves of De cs: This	PO4 PO4 2 2 Reasona po Depen ependab module	and societ agement a purse out PO5 2 able; 2 – 5 adable Al le AI. focuses	y, <b>PO</b> 7- Ér nd finance comes w <b>PO</b> 6 Significan I: This m on ethica	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>t; 3 - Stro</b> odule cove	and sustair long Learn n outcom PO <sub>8</sub> ng ers the b ations wh	PO9 2 assic co	PO <sub>8</sub> - E PO	Ethic	PO1	- Individua <b>PO</b> <sub>12</sub> nges, an
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	Modern t PO10- Comr PO1 3 tents:	Ir o'A as	age, <b>P</b> ation, <b>PO</b> <sub>2</sub> 2 2 1 2 1 5 5 5 6 1 7 1 8 5 6 1 7	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 1 - uction to ves of De cs: This ness, according	PO4 PO4 2 2 Reasona po Depen ependab module ountabil	and societ agement a purse out PO5 2 able; 2 – 5 adable Al le AI. focuses ity, trans	y, PO7- Er nd finance comes w PO6 Significan I: This m on ethica parency,	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>t; 3 - Stro</b> odule cove and privac	and sustair long Learn n outcom PO <sub>8</sub> ers the b ations wh y.	PO9 PO9 2 pasic co	POs- E PO 3 oncep	Ethic 10 ts, q	PO1 PO1 challe	- Individua PO12 nges, an ems, suc
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	Modern tr PO10- Comr PO1 3 tents: 1	Ir of A as	age, P ation, PO2 2 2 2 ntrodu bjectiv I Ethi s fairn I Safe	06- The e PO11- Pro Mapp PO3 2 2 1 - 1 - uction to ves of De cs: This ness, accuty and Ro	PO4 PO4 2 2 Reasone Dependab module ountabil eliability	PO5 PO5 able; 2 – 5 dable Al le Al. focuses ity, trans r: This mo	y, PO7- Er nd finance comes w PO6 Significar I: This m on ethica parency, odule cov	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>tr; 3 - Stro</b> odule cove and privac ers technic	PO8 PO8 ers the b ations wh y. pues for er	PO9 PO9 2 pasic co	POs- E PO 3 oncep	Ethic 10 ts, q	PO1 PO1 challe	- Individu
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	Modern tr PO10- Comr PO1 3 tents: 1	Ir of A as of A	age, <b>P</b> ation, <b>PO</b> 2 2 2 2 1 2 1 5 5 6 1 5 6 1 5 6 1 5 6 1 5 6 1 5 7 1 2 2 2 2 2 2 2 3 2 3 2 3 3 3 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- 1 uction to ves of De cs: This ness, accor- ty and R- ystems, s	PO4 PO4 2 2 <b>Reason</b> pependab module ountabil eliability uch as to	PO5 PO5 2 able; 2 – 5 dable Al le AI. focuses ity, trans c: This mo esting, ve	PO <sub>7</sub> - Er nd finance comes w PO <sub>6</sub> Significar I: This m on ethica parency, odule coverificatior	vironment a , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> ut; 3 – Strow odule cove and privac ers technic a, and valid	PO <sub>8</sub> PO <sub>8</sub> ers the b ations wh y. pues for en ation.	PO9 2 2 asic co en dev	PO <sub>8</sub> - E PO 3 oncep elopin	tts, of Asafet	PO1 PO1 challe	- Individu PO <sub>12</sub> nges, an ems, suc reliabilit
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	Modern tr PO10- Comr PO1 3 tents: 1	Ir O A A O R	age, P ation, PO2 2 2 2 2 1 Ethi s fairm I Safe f AI sy obust	06- The e PO11- Pro Mapp PO3 2 2 1- 1 1 1 1 1 1 1 1 1 1 1 1 1	PO4 PO4 PO4 2 2 2 Reasona c Dependab module ountabil eliability uch as ta d Resilia	PO5 PO5 2 able; 2 – 5 dable Al le Al. focuses ity, trans c: This mo esting, ve	y, PO7- Er nd finance comes w PO6 Significar I: This m on ethica parency, odule cov erificatior is modul	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>tr; 3 - Stro</b> odule cove and privac ers technic	and sustair long Learn n outcom PO <sub>8</sub> ers the b ations wh y. ques for e ation. s how to	ability, ing es PO <sub>9</sub> 2 Dasic co en dev nsuring	PO <sub>8</sub> - E PO PO a a a a concep elopin g the s	tts, of Asafet	PO1 PO1 challe	- Individu POn nges, an ems, suc reliabilit
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	Modern tr PO10- Comr PO1 3 tents: 1	Ir o A as R r E	age, P ation, PO2 2 2 2 1 trodu bjectiv I Ethi s fairn I Safe f AI sy obust esilien xplain	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- 1 ction to ves of De cs: This ness, according ty and Re vstems, s in ess and to erromable AI:	PO4 PO4 PO4 2 2 Reasona D Dependab module ountabil eliability uch as to d Resilie ors, adve This mod	PO5 PO5 able; 2 – 5 able; 2 – 5 dable Al le Al. focuses ity, trans r: This mo esting, ve ence: Th rsarial at odule foc	y, PO7- Er nd finance comes w PO6 Significar I: This m on ethica parency, odule cov erificatior is modul ctacks, and cuses on	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>PO</b> <sub>7</sub> <b>diff</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>program</b> <b>ith</b> <b>program</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>program</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>program</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>program</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>program</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>program</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>program</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>program</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>program</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>program</b> <b>ith</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>po</b> <sub>7</sub> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>ith</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b>	PO <sub>8</sub> PO <sub>8</sub> PO <sub>8</sub> ers the b ations wh y. ques for en ation. s how to expected s for mak	PO9 PO9 2 pasic co nsuring o make <u>situatic</u> ing AI	PO <sub>8</sub> - F PO PO a a a a a a b ncep elopin g the s AI syons. system	ts, of Assafet	PO1 PO1 challe I syst	- Individu
problems, PO5- or team work, F Course Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit:	Modern tr PO10- Comm PO1 3 tents: 1 2	Ir A A C R C E E E	age, P ation, PO2 2 2 2 atrodu bjecti I Ethi s fairn I Safe f AI sy obust esilien xplain	06- The e PO11- Pro Mapp PO3 2 2 1- 1- 1 1 1 1 1 1 1 1 1 1 1 1 1	PO4 PO4 PO4 2 2 Reasona b Dependab module ountabil eliability uch as ta d Resilia ors, adve This mothat hum	and societ agement a purse out PO5 2 able; 2 – 5 able; 2 – 5 adable Al le AI. focuses ity, trans r: This mo esting, ve ence: Th rsarial at odule foo nans can	y, PO7- Er nd finance comes w PO6 Significar I: This m on ethica parency, odule cov erificatior is modul ttacks, and cuses on understa	vironment a , PO <sub>12</sub> - Life- ith program PO <sub>7</sub> <b>PO</b> 7 <b>dule cove</b> and privac ers technic ers technic e discusse d other und techniques nd how the	ers the b ations why. ues for et ation. s how to expected s for mak	PO9 PO9 2 pasic co nsuring o make situatic ing AI lecisior	PO <sub>8</sub> - F PO PO PO PO PO PO PO PO PO PO PO PO PO	tts, of a state of the state of	PO1 PO1 challe I syst cy and ems re ransp	- Individu
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	Modern tr PO10- Comm PO1 3 tents: 1 2	Ir of A as R c E e H	age, P ation, PO2 2 2 2 1 1 1 1 2 1 2 1 2 1 2 1 2 1 5 1 5	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- 1 ction to ves of De cs: This ness, accord ty and Ro /stems, s mess and to error nable AI: nable, so n-AI Into	PO4 PO4 2 2 Reasona b Dependab module ountabil eliability uch as ta d Resilic ors, adve This mo that hun eraction	and societ agement a purse out PO5 2 able; 2 – 9 able; 2 – 9 adable Al le AI. focuses ity, trans r: This mo esting, ve ence: Th rsarial at odule foc nans can : This m	y, PO7- Er nd finance comes w PO6 Significar I: This m on ethica parency, odule cov erificatior is modul ttacks, and cuses on understa module	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>PO</b> <sub>7</sub> <b>d</b> <b>d</b> <b>e</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b>	and sustair long Learn n outcom PO <sub>8</sub> ers the b ations wh y. ques for e ation. s how to expected s for mak ey make d e design	PO9 PO9 2 pasic co nsuring o make situatio ing AI lecisior of hu	PO <sub>8</sub> - F PO PO PO PO PO PO PO PO PO PO PO PO PO	tts, of a state of the state of	PO1 PO1 challe I syst cy and ems re ransp	- Individu
problems, PO5- or team work, F Course Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit:	Modern tr PO10- Comm PO1 3 tents: 1 2	Ir of A as A C R E E E E E H H ir	age, P ation, PO2 2 2 2 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2 1	06- The e PO11- Pro Mapp PO3 2 2 1- Action to ves of De cs: This ness, according ty and Ro vstems, s ness and to error nable Al: nable, so n-Al Into ctions, in	PO4 PO4 2 2 Reasona Dependab module ountabil eliability uch as tr d Resilie ors, adve This mo that hun eraction cluding	and societ agement a purse out PO5 2 able; 2 – 5 adable Al le AI. focuses ity, trans r: This mo esting, ve ence: Th rsarial at odule foc nans can : This mu	y, PO7- Er nd finance comes w PO6 Significar I: This m on ethica parency, odule cov erificatior is modul ttacks, and cuses on understa module co	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>PO</b> <sub>7</sub> <b>d</b> <b>d</b> <b>e</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b>	and sustair long Learn n outcom PO <sub>8</sub> PO <sub>8</sub> ers the b ations wh y. ques for er ation. s how to expected s for mak ey make d e design ollaborati	PO9 PO9 2 2 assic co en dev nsuring o make situatio ing AI lecisior of hu on.	PO <sub>8</sub> - F PO PO g the s oncep elopin g the s ons. system is. iman-	tts, of the second seco	PO1 PO1 challe I syst ems re rransp inter	- Individu
problems, PO5- or team work, F Course Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit:	Modern t       PO10- Comm       PO1       3	Ir o' A as A o R r e E E e H H ir R	age, P ation, PO2 2 2 2 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2 1	06- The e PO11- Pro Mapp PO3 2 2 1- 1- 1- 1- 1- 1- 1- 1- 1- 1-	PO4 PO4 PO4 2 2 Reasone Dependab module ountabil eliability uch as to d Resilie ors, adve This mo that hun eraction cluding in nt and	and societ agement a purse out PO5 2 able; 2 – 9 adable Al le Al. focuses ity, trans r: This mo esting, ve ence: This resarial at odule foc nans can : This mu user expendence	y, PO7- Er nd finance comes w PO6 Significar I: This m on ethica parency, odule coverification is modul tacks, and cuses on understa module of erience, t nent: Th	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>PO</b> <sub>7</sub> <b>ut; 3 - Stroo</b> odule cover and privace ers technice and privace ers technice and valid e discussed d other und techniques nd how the covers the rust, and column	and sustair long Learn n outcom PO <sub>8</sub> PO <sub>8</sub> ers the b ations wh y. ques for er ation. s how to expected s for mak ey make d e design ollaborati	PO9 PO9 2 2 assic co en dev nsuring o make situatio ing AI lecisior of hu on.	PO <sub>8</sub> - F PO PO g the s oncep elopin g the s ons. system is. iman-	tts, of the second seco	PO1 PO1 challe I syst ems re rransp inter	- Individu
problems, PO <sub>5</sub> - or team work, H Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit: Unit:	Modern t       PO10- Comm       PO1       3	Ir of A as A o R r e E E e H H ir R n	age, P ation, PO2 2 2 2 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2 1	06- The e PO11- Pro Mapp PO3 2 2 1- 1- 1- 1- 1- 1- 1- 1- 1- 1-	PO4 PO4 PO4 2 2 Reasona Dependab module ountabil eliability uch as to d Resilie ors, adve This mo that hun eraction cluding to nt and associat	and societ agement a purse out PO5 2 able; 2 – 9 adable Al le Al. focuses ity, trans r: This mo esting, ve ence: This resting, ve ence: This resting at odule foc nans can r: This mo esting at odule foc	y, PO7- Er nd finance comes w PO6 Significar I: This m on ethica parency, odule coverification is modul tacks, and cuses on understa module of erience, t nent: Th AI system	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>PO</b> <sub>7</sub> <b>ut; 3 - Stroo</b> odule cover and privace ers technice and privace ers technice and valid e discussed <u>d other une</u> techniques nd how the covers the rust, and column	PO8 PO8 PO8 PO8 ers the b ations wh y. ques for er ation. s how to expected s for mak ey make d e design ollaborati covers the	PO9 PO9 2 Dasic co nsuring o make <u>situatio</u> ing AI lecisior of hu on.	PO <sub>8</sub> - F PO PO PO PO PO PO PO PO PO PO PO PO PO	tts, ong A safet s	PO1 PO1 challe I syst ransp interf identi	- Individu
problems, PO <sub>5</sub> - or team work, I Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit: Unit:	Modern t       PO10- Comm       PO1       3       Lents:       2       3	Ir ool ussimunic Ir ool A as A oo R R r e E E e: H H ir R R m C	age, P ation, PO2 2 2 2 2 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- 1 ction to ves of De cs: This ness, accor ty and Re vstems, s cness and to erro nable AI: nable, so n-AI Into ssessmer ing risks tudies: T	PO4 PO4 PO4 2 2 2 Reasona Dependab module ountabil eliability uch as to d Resilie ors, adve This mod that hum eraction cluding m nt and associat his mod	and societ agement a purse out PO5 2 able; 2 – 5 able;	PO7- Er nd finance comes w PO6 Significar Significar I: This m on ethica parency, odule cove erificatior is modul tacks, and cuses on understa module cove erience, t ment: Th AI system ines real-	PO12- Life- ith program PO12- Life- ith program PO7 PO7 dt; 3 - Strow odule cover and privace ers technice and privace ers technice and valid e discussed d other und techniques and how the covers the rust, and co is module s. -world exa	and sustair long Learn n outcom PO <sub>8</sub> ers the b ations wh y. ques for er ation. s how to expected s for mak ey make d e design ollaborati covers to	PO9 PO9 2 2 aasic co en dev nsuring o make situatio ing AI lecisior of hu on. technic	PO <sub>8</sub> - F PO PO PO PO PO PO PO PO PO PO PO PO PO	Ethic Ho ts, o ng A safet yste ms t -AI for =	PO1 PO1 challe challe rms re ransp interf identi	- Individu PO12 PO12 nges, an ems, succ reliabilit obust an arent an faces an fying an
problems, PO <sub>5</sub> - or team work, H Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit: Unit:	Modern t       PO10- Comm       PO1       3       tents:       1       2       3       4	Ir ool us Ir ool A ar A A A A C R C C a	age, P ation, PO2 2 2 2 2 atrodu bjectiv I Ethi s fairm I Safe f AI sy obust esilien xplain tuman aterac isk Ai anagi ase St utono	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- 1 ction to ves of De cs: This ness, according ty and Re vstems, s in ess and to error nable AI: nable, so n-AI Into tions, in- ssessmer ing risks tudies: Tomous ve	PO4 PO4 PO4 2 2 Reasona D Depende D D D D D D D D D D D D D D D D D D D	PO5 PO5 PO5 PO5 able; 2 – 5 able; 2 – 5 ab	PO7- Er nd finance comes w PO6 Significar Comes w PO6 Significar Comes w PO6 Significar Comes w Comes w Comes comes Comes comes comes Comes comes Comes comes Comes comes comes Comes comes comes Comes comes comes comes Comes comes comes comes comes comes Comes comes comes comes comes comes comes comes Comes comes come	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>PO</b> <sub>7</sub> <b>dut: 3 - Stroo</b> odule cove and privac ers technic ers technic e discussed d other und techniques nd how the covers the rust, and co is module s. -world exa systems, an	PO <sub>8</sub> PO <sub>8</sub> PO <sub>8</sub> ers the b ations wh y. ques for en ation. s how to expected s for mak ey make d e design ollaborati covers to mples of 1 d financia	PO9 PO9 2 2 assic co en dev nsuring b make <u>situatio</u> ing AI lecisior of hu on.	PO <sub>8</sub> - F PO PO PO PO PO PO PO PO PO PO PO PO PO	tts, o ng A safet yste ns t -AI	PO1 PO1 challe challe identi identi n action.	- Individu
problems, PO5- or team work, H Course Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: Unit: Unit:	Modern t       PO10- Comm       PO1       3       tents:       1       2       3       4	Ir Ir A A A A C R C a a F	age, P ation, PO2 2 2 2 2 atrodu bjecti I Ethi s fairm I Safe f AI sy obust esilien xplain tuman aterac isk Ai anagi ase Si utono uture	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- 1- 1 ction to ves of De cs: This ness, accor- ty and Ra vstems, s iness and to error nable AI: nable, so n-AI Into ssessmer ing risks tudies: T- omous ve Directi	PO4 PO4 PO4 2 2 Reasona Dependende pendab module ountabil eliability uch as ta d Resilia ors, adve This mod that hum eraction cluding to nt and associat his mod hicles, n ons: Th	PO5 PO5 PO5 2 able; 2 – 5 able; 2 – 5 able	y, PO7- Er nd finance comes w PO6 Significar Comes w PO6 Significar Comes w PO6 Significar Comes w Comes w Comes w Comes comes	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>PO</b> <sub>7</sub> <b>du</b> t; <b>3 - Stroo</b> odule cove and privac ers technic ers technic techniques nd how the covers the rust, and co is module s. -world exa systems, an sses ements	PO <sub>8</sub> PO <sub>8</sub> PO <sub>8</sub> ers the b ations wh y. ques for en ation. s how to expected s for mak ey make d e design ollaborati covers to mples of 1 d financia	PO9 PO9 2 2 assic co en dev nsuring b make <u>situatio</u> ing AI lecisior of hu on.	PO <sub>8</sub> - F PO PO PO PO PO PO PO PO PO PO PO PO PO	tts, o ng A safet yste ns t -AI	PO1 PO1 challe challe identi identi n action.	- Individu
Course Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: Unit: Unit: Unit:	Modern t         PO10- Comm         PO1         3         tents:         1         2         3         4         5	Ir Ir A A A A A C R F H Ir C A A C A C A C A C A C A C A C A C A	age, P ation, PO2 2 2 2 2 atrodu bjecti I Ethi s fairm I Safe f AI sy obust esilien xplain tuman aterac isk An anagi ase St utono uture epend	06- The e PO11- Pro Mapp PO3 PO3 2 1- 1- 1- 1- 1- 1- 1- 1- 1- 1-	PO4 PO4 PO4 2 2 Reasona Dependende pendab module ountabil eliability uch as ta d Resilie ors, adve This mod that hum eraction cluding to nt and associat his mod hicles, n ons: Th research	and societ agement a purse out PO5 2 able; 2 – 5 able;	y, PO7- Er nd finance comes w PO6 Significar Comes w PO6 Significar Comes w PO6 Significar Comes w Comes w Comes w Comes comes Comes comes comes Comes comes comes Comes comes comes Comes comes comes comes Comes comes comes comes Comes comes comes comes comes comes comes comes Comes comes	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>PO</b> <sub>7</sub> <b>dut: 3 - Stroo</b> odule cove and privac ers technic ers technic ers technic and valid e discussed d other und techniques nd how the covers the rust, and co is module s world exa systems, an sses ement.	and sustair long Learn n outcom PO <sub>8</sub> ers the b ations wh y. ques for er ation. s how to expected s for mak ey make de e design ollaborati covers to mples of l ad financia	PO9 PO9 2 2 vasic co en dev nsuring o make situatio ing AI lecisior of hu on. technic Depence al fraud nds ar	PO <sub>8</sub> - F PO PO PO PO PO PO PO PO PO PO PO PO PO	Ethic Ho ts, o ng A safet yste ms t -AI for = AI in ction ture	PO1 PO1 challe challe I syst y and ems re interf identi identi n actio n. e dire	- Individu
Course Outcomes CO1 CO2 CO3 CO4 Detailed Cont Unit: Unit: Unit:	Modern ti         PO10- Comm         PO1         3         tents:         1         2         3         4         5         and Eval	Ir of A as A A C R R E E E E E E H H ir Ir O A A as C A A C A C A A D D J J J J J J J J J J J J J J J J	age, P ation, PO2 2 2 2 2 3 3 4 4 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	O <sub>6</sub> - The e PO <sub>11</sub> - Pro Mapp PO <sub>3</sub> 2 2 1- uction to ves of De cs: This ness, acco ty and Ro /stems, s ness, acco ty and Ro /stems, s ness and to error nable AI: nable, so n-AI Into storessmenting risks tudies: T mous ve Directi dable AI ttern: It	PO4 PO4 PO4 2 2 Reasona Depende Depend	and societ agement a purse out PO5 2 able; 2 – 9 able; 2 – 9 adable Al le AI. focuses ity, trans r: This mo esting, ve ence: Th rsarial at odule foc nans can : This mo user expe Manager ed with A ule exam nedical d is modu n and dev both int	y, PO7- Er nd finance comes w PO6 Significar Comes w PO6 Significar Comes w PO6 Significar Comes w Comes w Comes w Comes w Comes comes Comes comes comes Comes comes Comes comes comes Comes comes comes Comes comes comes Comes comes comes Comes comes comes comes Comes comes comes comes comes comes Comes comes comes comes comes Comes comes com	vironment a , <b>PO</b> <sub>12</sub> - Life- ith program <b>PO</b> <sub>7</sub> <b>PO</b> <sub>7</sub> <b>d</b> <b>d</b> <b>e</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b> <b>i</b>	and sustair long Learn n outcom PO <sub>8</sub> ers the b ations wh y. ques for e ation. s how to expected s for mak ey make d e design ollaborati covers t mples of l ad financia rging tre 0 marks)	PO9 PO9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>8</sub> - F PO PO PO PO PO PO PO PO PO PO PO PO PO	Ethic Ho Ho ts, o ng A safet yste ms t -AI for ture two	PO1 PO1 challe challe dissection ransp interf idention action e dire class	- Individu

Text	Books:
1	Designing AI: Reliable, Scalable, and Maintainable Models" by Dr. Susan E. McGregor
2	Responsible AI: A Global Policy Framework" by the IEEE Global Initiative on Ethics of Autonomous and Intelligent
	Systems
Refe	rence Books:
1	Building Dependable Distributed Systems" by Peter G. Neumann
2	Trustworthy Machine Learning" by Martin Vechev, Alina Sîrbu, and Mijung Park

Course Cod					Course '				-	ture	_	
MTCS225PE	ET					sing and A			L	T P	Sen	nester: II
Version: 1.2	~ 1			e of App	roval: 161	th BoS 17-			4	0 0		
	Scheme						2	Scheme o				100
	Periods		Hrs.							n Score		100
Periods	Credits	: 4     Internal Evalu       : 4     End Sem								30 70		
Instruction		: 4 : Lecture								uration		70 3 Hrs.
Prerequisite(s): A									Exam D	ulation	•	51115.
Course Objective		menge	ince									
<ol> <li>To learn the intensity trans</li> <li>To learn basis</li> <li>To learn at compression</li> <li>To learn month</li> </ol>	nsformat ics of fre oout wa method	tions and equency velets a ls.	d spatial domains nd othe	filtering. filtering r transf	, image r ormatio	estoration ns, basics	n and recor s of color	nstructio image	n conce process	pts. sing and		
Course Outcome		cui iniug	e proces.	sing com	cepts un	a various	initige begi	inentatioi	i teenin	ques.		
COs No.					Statem					01		Program es (POs)
i	ntensity	r transfo	rmations		0	0 1	cessing, c				<b>PO</b> <sub>1</sub> ,	
i	mage re	storatio	n and rec	construc	tion		atial and fr		domain	s,	<b>PO</b> <sub>2</sub> ,	
			<u> </u>			8	e transform				<b>PO</b> <sub>4</sub> ,	
CO <sub>4</sub> I PO <sub>1</sub> - Engineering k							entation al				•	9, <b>PO</b> 10
Course Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	ith progran PO7	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO <sub>11</sub>	PO
<b>CO</b> <sub>1</sub>	3	2										
<b>CO</b> <sub>2</sub>		2	2									
<u>CO3</u>				2	2				0	0		
CO <sub>4</sub>			1	2	-11 2		4.2 64		2	3		
	4 ~~ 4		1-	Reason	ible; Z – S	Significan	ut; 3 – Stron	ng				
Detailed Conten	ts:	Inducal				Distal I.	nage Fund			sta of V		
Unit: 1		Light a in Sau <b>Transt</b> Histog	nd the E npling a <b>ormatio</b> ram Proe	Electrom and Qua <b>ns and</b> cessing,	agnetic S antizatio <b>Spatial</b> Fundam	Spectrum n, Some <b>Filtering</b> , entals of	, Image Sar Basic Re Some Ba Spatial Filt	mpling ar elationshi sic Inten tering, T	nd Quar ps Bet sity Tra 'he Meo	ntization, ween P ansforma chanics c	Basic ixels; ition H of Line	Concept Intensit
Filtering, Smoothing (Lowpass) SpaFiltering in the Frequency Dom Transform of Sampled Functions, Properties of the 2-D DFT and IDF Smoothing Using Lowpass Freque Filters; Image Restoration Degradation/Restoration Process, Spatial Filtering, Periodic Noise Position-Invariant Degradations, Minimum Mean Square Error (Wiet						Domain, I ns, The D DFT, The quency I and ss, Noise se Reduc s, Estima	Preliminary iscrete For Basics of I Domain Fil <b>Reconstru</b> Models, Re ction Usin ting the I	y Concep urier Tra Filtering i ters, Ima <b>action</b> , estoration g Freque Degradati	ots, Sar nsform n the Fi ge Sha A Mo in the i ency D on Fun	npling a of Two requency rpening odel of Presence omain F oction, Ir	nd the Variab Doma Using the of No iltering werse	les, Som iin, Imag Highpas - Imag ise Only- g, Linear Filtering
		<b>Wavel</b> Functi	<b>et and</b> ons in th	other 1	f <b>mage 7</b> Frequen	<b>Fransform</b> cy Plane,	<b>ns,</b> Matrix Basis Ima	-based ′ ges, Four	Fransfo ier-Rela	rms, Co ated Trai	rrelati 1sform	on, Basi s, Walsh

	Fundamentals, Point, Line, and Edge Detection, Thresholding, Segmentation by Region
	Growing and by Region Splitting and Merging, Region Segmentation Using Clustering and
	Super pixels, Region Segmentation Using Graph Cuts, Segmentation Using Morphological
	Watersheds, The Use of Motion in Segmentation
	Feature Extraction, Background, Boundary Preprocessing, Boundary Feature Descriptors,
	Region Feature Descriptors, Some Basic Descriptors, Principal Components as Feature
Unit: 5	Descriptors, Whole-Image Features, Scale-Invariant Feature Transform (SIFT); Image
	Pattern Classification, Background, Patterns and Pattern Classes, Pattern Classification by
	Prototype Matching, Optimum (Bayes) Statistical Classifiers
Examination and Evaluation	ation Pattern: It include both internal evaluation (30 marks) comprising two class sessional
exams/ assignments/ q	uiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
examination.	
Text Books:	
1 Rafael C Gonzalez	and Richard F. Woods — Digital Image Processing Pearson Education Fourth Edition 2019

1	Rafael C. Gonzalez and Richard E. Woods, —Digital Image Processing, Pearson Education, Fourth Edition, 2019.
2	Thomas B. Moeslund, —Introduction to Video and Image Processing: Building Real Systems and ApplicationsI,
	Springer, 2012.
Refe	rence Books:
1	Milan Sonka, Vaclav Halvac and Roger Boyle, —Image Processing, Analysis, and Machine VisionI, Second Edition,

Thomson Learning Publishers. Kenneth R.Castleman, —Digital Image Processingl, Pearson Education, 2006. 2

	de									ture			
MTCS331PI	ET			Artifici	al Neura	l Network			L	T P	Seme	ster: III	
Version: 1.2				of Appr	oval: 16tl	n BoS 17-1	1-2022		4	0 0			
	Scheme							Scheme of					
	f Periods	: 60	Hrs.					m Score		100			
Period	s/Week	: 4						Inte		aluation		30	
	Credits									emester		70	
Instructio									Exam L	Duration	:	3 Hrs.	
Prerequisite(s): A		itelligend	ce										
Course Objective		ofnour	1 notruco	ulta in on	rincorin	<i>a</i>							
<ol> <li>To understan</li> <li>To acquire th</li> </ol>							aadaling						
3. To implemen						ogintive n	llouening						
4. To analyze of			-			neural ne	tworks						
Course Outcome		.ion unu	aynanne	ui systei	no using	neururne							
COs No.	5 (00).			S	tatemen	t				Man	ped Pro	gram	
0001101				2							comes (		
CO <sub>1</sub>	Identify t	he neura	al netwo	rk algori	thms.						PO <sub>1</sub> , PO <sub>2</sub>		
CO <sub>2</sub>						n on the a	vailable	data set.			PO <sub>3</sub> , PO <sub>5</sub>		
CO <sub>3</sub>	117	,			0	and solve			ems.		PO <sub>3</sub> , PO <sub>5</sub>	;	
CO <sub>4</sub>	Perform	evaluatio	on of neu	iral netw	ork algo	rithms.		*			PO <sub>4</sub> , PO <sub>5</sub>		
PO1- Engineering K	nowledge,	PO <sub>2</sub> - Prol	olem anal	ysis, <b>PO</b> 3-	· Design/	developme							
problems, <b>PO</b> <sub>5</sub> - Mo										PO <sub>8</sub> - Ethio	es, <b>PO</b> 9- I	ndividua	
or team work, PO10	- Communi	cation, <b>P</b>											
Course			маррп	ig of cou		omes witł	i prograi	II outcom	es				
Outcomes	PO <sub>1</sub>	$PO_2$	$PO_3$	$PO_4$	$PO_5$	$PO_6$	$PO_7$	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	<b>PO</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>	
CO <sub>1</sub>	2	2											
	2	2	2		1								
CO <sub>3</sub>			2		2								
<u> </u>			-	2	-				1				
			1 – F		le: 2 – Si	gnificant;	3 – Stro	na	1				
Detailed Content	ts:				,	<u></u>		9					
		Genera	l charac	teristics	of the l	numan br	ain, Intr	oduction	to Biolo	gical Ne	ural Ne	tworks,	
Unit: 1		Nerve	structur	e and s	ynapse,	Basic co	ncepts (	of Neural	Netwo	orks, Cha	aracteris	stics of	
		Neural	Networl	ks, Term	inologies	Applicat		ha artifici	al neuro	al networ	·ks.		
				,	monogies	s, Applicat	ions of t						
		Struct		neural n	et (topo	logy), Dire	ected gra	phs, Mod	els of N	euron, N	eural Ne		
Unit: 2		Struct Archite	ctures, A	neural n Artificial	et (topo Neuron,	logy), Dire Activatio	ected gra n functio	phs, Mod ons, Thres	els of No shold fu	euron, N nction, F	eural Ne iecewis	e linear	
Unit: 2		Struct Archite functio	ctures, A n, Sigmo	neural n Artificial	et (topo Neuron,	logy), Dire	ected gra n functio	phs, Mod ons, Thres	els of No shold fu	euron, N nction, F	eural Ne iecewis	e linear	
Unit: 2		Struct Archite functio Learnir	ctures, A n, Sigmo ng.	neural n Artificial oidal funo	et (topo Neuron, ction, Su	logy), Dire Activatio pervised I	ected gra n functio learning,	phs, Modons, Thres Unsuper	els of No shold fu vised lea	euron, N nction, F arning, R	eural Ne 'iecewise e-enfor	e linear cement	
Unit: 2		Struct Archite functio Learnir Knowle	ctures, A n, Sigmo ng. edge Rep	neural n Artificial oidal fund resentat	et (topo) Neuron, ction, Su ion, Arti	logy), Dire Activatio pervised 1 ficial Intel	ected gra n functio learning, lligence,	phs, Modons, Thres Unsuperv learning r	els of No shold fu vised lea rules, Er	euron, N nction, F arning, R ror corre	eural Ne Piecewise e-enfore ection le	e linear cement arning,	
Unit: 2 Unit: 3		Struct Archite functio Learnir Knowle Memor	ectures, A n, Sigmo ng. edge Rep y based	neural n Artificial bidal fund resentat learnin	et (topo Neuron, ction, Su ion, Arti g, Hebb	logy), Dire Activatio pervised ficial Intel ian learn	ected gra n functio learning, lligence, ing, Cor	phs, Mod ons, Thres Unsuper learning r npetitive	els of No shold fur vised lea rules, Er learnin	euron, N nction, F arning, R ror corre g, Boltzi	eural Ne Piecewise e-enfore ection le nann le	e linear cement arning, arning,	
		Struct Archite functio Learnir Knowle Memor single	ctures, A n, Sigmo ng. edge Rep y based layer pe	neural n Artificial bidal fund resentat learnin rceptror	et (topo Neuron, ction, Su ion, Arti g, Hebb	logy), Dire Activatio pervised 1 ficial Intel	ected gra n functio learning, lligence, ing, Cor	phs, Mod ons, Thres Unsuper learning r npetitive	els of No shold fur vised lea rules, Er learnin	euron, N nction, F arning, R ror corre g, Boltzi	eural Ne Piecewise e-enfore ection le nann le	e linear cement arning, arning,	
		Struct Archite functio Learnir Knowle Memor single Networ	ctures, <i>i</i> n, Sigmo ng. edge Rep y based layer pe k prunir	neural n Artificial bidal fund resentat learnin rceptror ng.	et (topo Neuron, ction, Su ion, Arti g, Hebb n, Multil	logy), Dire Activatio pervised ficial Inte ian learn ayer perc	ected gra n functio learning, lligence, ing, Cor eptron,	phs, Mod ons, Thres Unsuper learning r npetitive Back pro	els of No shold fur vised lea rules, Er learnin pagation	euron, N nction, F arning, R ror corre g, Boltzi n, Recur	eural Ne Piecewise e-enfore ection le nann le rent ne	e linear cement carning, carning, tworks,	
Unit: 3		Struct Archite functio Learnin Knowle Memor single Networ Adaptiv	ctures, A n, Sigmo ag. edge Rep y based layer pe <u>'k prunir</u> e netw	neural n Artificial bidal fund resentat learnin rceptror ng. rorks, S	et (topo, Neuron, ction, Su ion, Arti g, Hebb n, Multil upervise	logy), Dire Activatio pervised ficial Intel ian learn ayer perc d Learni	ected gra n functio learning, lligence, ing, Cor eptron, ing Neu	phs, Mod ons, Thres Unsuper learning r npetitive Back pro ral Netw	els of No shold fu vised lea ules, Er learnin pagation vorks,	euron, N nction, F arning, R rror corre g, Boltzi n, Recur Decision	eural Ne Piecewise e-enfore ection le mann le rent ne -based	e linear cement carning, arning, tworks, neural	
		Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ	ctures, A n, Sigmo ag. edge Rep y based layer pe rk prunir ze netw ks, Hier	neural n Artificial bidal fund resentat learnin rceptror bg. orks, S rarchical	et (topo Neuron, ction, Su ion, Arti g, Hebb n, Multil upervise neural	logy), Dire Activatio pervised 1 ficial Intel ian learn ayer perc d Learni network	ected gra n functio learning, lligence, ing, Cor eptron, ing Neu cs, Prob	phs, Mod ons, Thres Unsuper learning r npetitive Back pro ral Netw abilistic	els of No hold fu vised lea ules, Er learnin pagation vorks, neural	euron, N nction, F arning, R ror corro g, Boltzr n, Recur Decision network	eural Ne Piecewise e-enfor- ection le nann le rent ne -based	e linear cement carning, arning, tworks, neural	
Unit: 3		Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio	ctures, A n, Sigmo ag. edge Rep y based layer pe k prunir re netw ks, Hier n netwo	neural n Artificial bidal fund resentat learnin rceptror ng. rorks, S rarchical rks, Com	et (topo Neuron, ction, Su ion, Arti g, Hebb h, Multil upervise neural parision	logy), Dire Activatio pervised 1 ficial Intel ian learn ayer perc d Learni network	ected gra n functio learning, lligence, ing, Cor eptron, ing Neu ss, Prob etworks	phs, Mod ons, Thres Unsuper learning r npetitive Back pro ral Netw abilistic and multi	els of No hold fu- vised lea ules, Er learnin pagation vorks, neural layer pe	euron, N nction, F arning, R ror corro g, Boltzi n, Recur Decision network erceptroi	eural Ne Piecewise e-enfore ection le mann le rent ne -based c, Radia	e linear cement arning, arning, tworks, neural l basis	
Unit: 3		Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi	ctures, A n, Sigmo ag. edge Rep y based layer pe <u>k prunir</u> ve netw ks, Hier <u>n netwo</u> cation o	neural n Artificial bidal fund resentat learnin rceptror ng. rorks, S rarchical rks, Com f linearly	et (topo Neuron, ction, Su ion, Arti g, Hebb n, Multil upervise neural parision y separab	logy), Dire Activatio pervised 1 ficial Intel ian learn ayer perc d Learni network	ected gra n functio learning, lligence, ing, Cor eptron, ing Neu cs, Prob etworks ns, Boltz	phs, Mod ons, Thres Unsuper learning r npetitive Back pro ral Netw abilistic and multi mann mac	els of No hold fu- vised lea ules, Er learnin pagation vorks, neural layer pe chine, Si	euron, N nction, F arning, R ror corro g, Boltzi n, Recur Decision network erceptroi igmoid B	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne	e linear cement arning, arning, tworks, neural l basis tworks,	
Unit: 3 Unit: 4 Unit: 5		Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi Helmho Algorit	ctures, A n, Sigmo ag. edge Rep y based layer pe <u>k prunir</u> re netwo ks, Hiet n netwo cation o oltz ma nms, Op	neural n Artificial bidal fund resentat learnin rceptror ng. orks, S rarchical rks, Com f linearly chine, timizatio	et (topo Neuron, ction, Su ion, Arti g, Hebb n, Multil upervise neural parision v separat Support n, Predio	Activatio Activatio pervised 1 ficial Intel ian learn ayer perce d Learni network of RBF N ole pattern vector ction Syst	ected gra n functio learning, lligence, ing, Cor eptron, etworks ns, Prob etworks ns, Boltzi machir ems, spe	phs, Mod ons, Thres Unsuper learning r npetitive Back pro ral Netw abilistic and multi mann mac ues, Self- ech and d	els of No hold fu- vised lea ules, Er learnin pagation vorks, neural layer pe chine, Si organiz lecision	euron, N nction, F arning, R ror corre g, Boltzi n, Recur Decision network erceptroi igmoid B zation r -making	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne naps, (	e linear cement arning, arning, tworks, neural l basis tworks, Genetic	
Unit: 3 Unit: 4 Unit: 5 <b>Examination and</b>		Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi Helmho Algorith	ctures, <i>A</i> n, Sigmo ag. edge Rep y based layer pe <u>k prunir</u> re netwo cation o pltz ma hms, Op ern: It in	neural n Artificial bidal fund resentat learnin rceptror ng. orks, S rarchical rks, Com f linearly achine, timizatio nclude b	et (topo Neuron, ction, Su ion, Arti g, Hebb n, Multil upervise neural parision v separat Support n, Predi oth inte	Activatio pervised 1 ficial Intel ian learn ayer perc d Learni network of RBF N ole pattern vector ction Syst rnal evalu	ected gra n functio learning, lligence, ing, Cor eptron, etworks ns, Prob etworks ns, Boltzi machir ems, spe iation (3	phs, Mod ons, Thres Unsuper- learning r npetitive Back pro rral Netw abilistic and multi mann mac ues, Self- ech and d 0 marks)	els of No shold fu- vised lea ules, Er learnin pagation vorks, neural layer pe chine, Si organiz lecision compri	euron, N nction, F arning, R ror corre g, Boltza n, Recur Decision network erceptron igmoid B zation r -making sing two	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne naps, (	e linear cement arning, arning, tworks, neural l basis tworks, Genetic essiona	
Unit: 3 Unit: 4 Unit: 5 <b>Examination and</b> exams/ assignment		Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi Helmho Algorith	ctures, <i>A</i> n, Sigmo ag. edge Rep y based layer pe <u>k prunir</u> re netwo cation o pltz ma hms, Op ern: It in	neural n Artificial bidal fund resentat learnin rceptror ng. orks, S rarchical rks, Com f linearly achine, timizatio nclude b	et (topo Neuron, ction, Su ion, Arti g, Hebb n, Multil upervise neural parision v separat Support n, Predi oth inte	Activatio pervised 1 ficial Intel ian learn ayer perc d Learni network of RBF N ole pattern vector ction Syst rnal evalu	ected gra n functio learning, lligence, ing, Cor eptron, etworks ns, Prob etworks ns, Boltzi machir ems, spe iation (3	phs, Mod ons, Thres Unsuper- learning r npetitive Back pro rral Netw abilistic and multi mann mac ues, Self- ech and d 0 marks)	els of No shold fu- vised lea ules, Er learnin pagation vorks, neural layer pe chine, Si organiz lecision compri	euron, N nction, F arning, R ror corre g, Boltza n, Recur Decision network erceptron igmoid B zation r -making sing two	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne naps, (	e linear cement arning, arning, tworks, neural l basis tworks, Genetic essiona	
Unit: 3 Unit: 4 Unit: 5 <b>Examination and</b> exams/ assignme examination.		Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi Helmho Algorith	ctures, <i>A</i> n, Sigmo ag. edge Rep y based layer pe <u>k prunir</u> re netwo cation o pltz ma hms, Op ern: It in	neural n Artificial bidal fund resentat learnin rceptror ng. orks, S rarchical rks, Com f linearly achine, timizatio nclude b	et (topo Neuron, ction, Su ion, Arti g, Hebb n, Multil upervise neural parision v separat Support n, Predi oth inte	Activatio pervised 1 ficial Intel ian learn ayer perc d Learni network of RBF N ole pattern vector ction Syst rnal evalu	ected gra n functio learning, lligence, ing, Cor eptron, etworks ns, Prob etworks ns, Boltzi machir ems, spe iation (3	phs, Mod ons, Thres Unsuper- learning r npetitive Back pro rral Netw abilistic and multi mann mac ues, Self- ech and d 0 marks)	els of No shold fu- vised lea ules, Er learnin pagation vorks, neural layer pe chine, Si organiz lecision compri	euron, N nction, F arning, R ror corre g, Boltza n, Recur Decision network erceptron igmoid B zation r -making sing two	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne naps, (	e linear cement arning, arning, tworks, neural l basis tworks, Genetic essiona	
Unit: 3 Unit: 4 Unit: 5 <b>Examination and</b> exams/ assignme examination. <b>Text Books</b> :	ents/ quiz	Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi Helmho Algorith on Patto / semin	ctures, A n, Sigmo ag. edge Rep y based layer pe <u>k prunir</u> ve netwo ks, Hier <u>n netwo</u> cation o cation o cltz ma <u>hms, Op</u> <b>ern:</b> It in ar prese	neural n Artificial bidal fund resentat learnin rceptror ng. rorks, S rarchical rks, Com f linearly chine, timizatio nclude b ntation e	et (topo Neuron, ction, Su ion, Arti g, Hebb h, Multil upervise neural parision v separat Support n, Predia oth inte	logy), Dire Activatio pervised 1 ficial Intel ian learn ayer perc d Learni network of RBF N ole pattern vector ction Syst rnal evalu external e	ected gra n functio learning, lligence, ing, Cor eptron, ing Neu cs, Prob etworks ns, Boltzi machir ems, spe iation (3 valuatior	phs, Mod ons, Thres Unsuper- learning r npetitive Back pro ral Netw abilistic and multi mann mac ues, Self- ech and d 0 marks) n (70 mark	els of No hold fu- vised lea ules, Er learnin pagation vorks, neural layer pe chine, Si organiz compri compri s) which	euron, N nction, F arning, R ror corre g, Boltzi n, Recur Decision network erceptroi igmoid B zation r -making sing two h is main	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne naps, (	e linear cement arning, arning, tworks, neural l basis tworks, Genetic essiona	
Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignme examination. Text Books: 1 S. Haykin, '	ents/ quiz 'Neural Ne	Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi Helmho Algorith on Patto / semin	ctures, A n, Sigmo ag. edge Rep y based layer pe k prunir ve netwo ks, Hier n netwo cation o oltz ma hms, Op ern: It in ar prese	neural n Artificial bidal fund resentat learnin rceptror ng. rorks, S rarchical rks, Com f linearly chine, timization nclude b ntation e ehensive	et (topo Neuron, etion, Su ion, Arti g, Hebb n, Multil upervise neural parision y separat Support n, Predic oth inte etc. and o	Activatio Activatio pervised 1 ficial Intel ian learn ayer perce d Learni network of RBF N ole pattern vector ction Syst rnal evalu external e	ected gra n functio learning, lligence, ing, Cor reptron, eptron, ang Neu cs, Prob etworks ns, Boltz machir ems, spe iation (3 valuation	phs, Mod ons, Thres Unsuper learning r npetitive Back pro ral Netw abilistic and multi mann mac ues, Self- ech and d 0 marks) n (70 mark	els of No shold fu- vised lea- rules, Er learnin pagation vorks, neural layer pe- chine, Si- organiz ecision compri- s) which ce-Hall	euron, N nction, F arning, R ror corre g, Boltzi n, Recur Decision network erceptron igmoid B zation r -making sing two h is main India.	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne naps, (	e linear cement arning, arning, tworks, neural l basis tworks, Genetic essiona	
Unit: 3 Unit: 4 Unit: 5 <b>Examination and</b> exams/ assignme examination. Text Books: 1 S. Haykin, ' 2 Laurene Fa	ents/ quiz <u>"Neural Neural Neusett, "Fu</u>	Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi Helmho Algorith on Patto / semin	ctures, A n, Sigmo ag. edge Rep y based layer pe k prunir ve netwo ks, Hier n netwo cation o oltz ma hms, Op ern: It in ar prese	neural n Artificial bidal fund resentat learnin rceptror ng. rorks, S rarchical rks, Com f linearly chine, timization nclude b ntation e ehensive	et (topo Neuron, etion, Su ion, Arti g, Hebb n, Multil upervise neural parision y separat Support n, Predic oth inte etc. and o	Activatio Activatio pervised 1 ficial Intel ian learn ayer perce d Learni network of RBF N ole pattern vector ction Syst rnal evalu external e	ected gra n functio learning, lligence, ing, Cor reptron, eptron, ang Neu cs, Prob etworks ns, Boltz machir ems, spe iation (3 valuation	phs, Mod ons, Thres Unsuper learning r npetitive Back pro ral Netw abilistic and multi mann mac ues, Self- ech and d 0 marks) n (70 mark	els of No shold fu- vised lea- rules, Er learnin pagation vorks, neural layer pe- chine, Si- organiz ecision compri- s) which ce-Hall	euron, N nction, F arning, R ror corre g, Boltzi n, Recur Decision network erceptron igmoid B zation r -making sing two h is main India.	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne naps, (	e linear cement arning, arning, tworks, neural l basis tworks, Genetic essiona	
Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignme examination. Text Books: 1 S. Haykin, ' 2 Laurene Fa Prentice Ha	ents/ quiz <u>"Neural Neural Neusett, "Fu</u> all, 1993	Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi Helmho Algorith on Patto / semin	ctures, A n, Sigmo ag. edge Rep y based layer pe k prunir ve netwo ks, Hier n netwo cation o oltz ma hms, Op ern: It in ar prese	neural n Artificial bidal fund resentat learnin rceptror ng. rorks, S rarchical rks, Com f linearly chine, timization nclude b ntation e ehensive	et (topo Neuron, etion, Su ion, Arti g, Hebb n, Multil upervise neural parision y separat Support n, Predic oth inte etc. and o	Activatio Activatio pervised 1 ficial Intel ian learn ayer perce d Learni network of RBF N ole pattern vector ction Syst rnal evalu external e	ected gra n functio learning, lligence, ing, Cor reptron, eptron, ang Neu cs, Prob etworks ns, Boltz machir ems, spe iation (3 valuation	phs, Mod ons, Thres Unsuper learning r npetitive Back pro ral Netw abilistic and multi mann mac ues, Self- ech and d 0 marks) n (70 mark	els of No shold fu- vised lea- rules, Er learnin pagation vorks, neural layer pe- chine, Si- organiz ecision compri- s) which ce-Hall	euron, N nction, F arning, R ror corre g, Boltzi n, Recur Decision network erceptron igmoid B zation r -making sing two h is main India.	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne naps, (	e linear cement arning, arning, tworks, neural l basis tworks, Genetic essiona	
Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignme examination. Text Books: 1 S. Haykin, ' 2 Laurene Fa	ents/ quiz "Neural No usett, "Fu all, 1993 :	Struct Archite functio Learnir Knowle Memor single Networ Adaptiv networ functio Classifi Helmho Algorith <b>on Patte</b> / semin	ctures, A n, Sigmo ng. edge Rep y based layer pe <u>k prunin</u> re netwo cation o pltz ma hms, Op ern: It in ar prese	neural n Artificial bidal fund resentat learnin rceptror og. orks, S rarchical rks, Com f linearly achine, timizatio nclude b ntation e ehensive eural Ne	et (topo Neuron, ction, Su ion, Arti g, Hebb n, Multil upervise neural parision v separat Support n, Predia oth inte etc. and o Founda	logy), Dire Activatio pervised 1 ficial Intel ian learn ayer perc d Learni network of RBF N ole pattern vector ction Syst rnal evalu external e tion" secce	ected gra n functio learning, lligence, ing, Cor eptron, etworks ns, Prob etworks ns, Boltzi machir ems, spe iation (3 valuation ond editio	phs, Mod ons, Thres Unsuper- learning r npetitive Back pro rral Netw abilistic and multi mann mac ues, Self- ech and d 0 marks) n (70 mark	els of No shold fu- vised lea ules, Er learnin pagation vorks, neural layer pe chine, Si organiz compri s) which ce-Hall d Applie	euron, N nction, F arning, R ror corre g, Boltzi n, Recur Decision network erceptron igmoid B zation r -making sing two h is main India.	eural Ne Piecewise e-enfor- ection le nann le rent ne -based c, Radia n. elief Ne naps, (	e linear cement arning, arning, tworks, neural l basis tworks, Genetic essiona	

	Course Co	ode				Course 7	Гitle			Lec	ture		
	MTCS332F	PET				Big Da				L	Т Р	Ser	nester: III
Versio	on: 1.2				e of App	r <b>oval:</b> 16t	h BoS 17-			4	0 0		
		Scheme						S	Scheme of				
		f Periods		Hrs.							n Score	:	100
	Period	s/Week	: 4				Internal Evaluat					:	30
	<b>T</b> , , , ,	Credits	: 4								mester	:	70
	Instructio			ture						Exam D	uration	:	3 Hrs.
	quisite(s): se Objectiv		intellige	nce									
	o introduc		and HI	)FS									
	o impart k	0			Reducer								
	o provide	0	-	-									
	o introduc		-	-	0		oon echo	system					
	se Outcom		iiiiiiig u	5013 1 10			oop ceno	system.					
	s No.					Statem	ent				Ma	pped	Program
													es (POs)
C	CO1	Perform	data ana	lysis in F	Hadoop f	ramewo	rk.					<b>PO</b> <sub>1</sub> ,	PO <sub>2</sub>
C	$CO_2$	Build app		•	-								PO <sub>3</sub>
	CO <sub>3</sub>	Model th		-	-		B.						PO <sub>5</sub>
	CO <sub>4</sub>			-		-	ig and Hiv	/e.			PC		$D_{9}, PO_{10}$
			-	-		-	-	nent of solu	tions PO4	Condu			•
								vironment a					
or tean	m work, <b>PO</b>	10- Commu	nication,					, <b>PO</b> 12- Life-					
				Марр	ing of co	ourse out	comes wi	ith progran	n outcom	es		1	
	ourse	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO	1 <b>PO</b> <sub>12</sub>
	tcomes									•	10		
	<u>CO1</u>	3	2	0									
	CO <sub>2</sub>		2	2	0	0							
	CO <sub>3</sub> CO <sub>4</sub>				2	2				2	3		
				1_	-	1410·2 - 9	Sianifican	nt; 3 – Stroi	na	2	3		
Detail	led Conte	nts:		-	Reusen		significan		ig				
			Introd	uction to	Big Dat	t <b>a:</b> Big Da	ata Impor	tant, Big Da	ata Soluti	on, Big	Data Use	e Case	s: IT for IT
						l Detecti							
			LUg AI	alytics, t	ne i rauc			n, social M	edia Patt	ern.			
	Unit: 1		The Ha	adoop Di	istribute	d Files	system: T	he Design	of HDFS	HDFS	Concept	s, Blo	cks, Name
	0111011		The Ha	adoop Di and Da	<b>istribute</b> ta node	e <b>d Files</b> s s, Block	<b>system:</b> T Caching	he Design , HDFS F	of HDFS ederation	HDFS , HDFS	High A	Availal	oility, The
			The Handes Comm	adoop Di and Da and-Line	<b>istribute</b> ta node e Interfae	<b>ed Files</b> s s, Block ce, Basic	<b>system:</b> T Caching File syste	The Design 5, HDFS Fo 5m Operatio	of HDFS ederation ons, Hado	HDFS , HDFS op File	5 High A systems	Availal , Inter	oility, The faces, The
			<b>The Ha</b> nodes Comma Java In	adoop Di and Da and-Line iterface,	<b>istribute</b> ta node Interfae Reading	<b>ed Files</b> s s, Block ce, Basic Data fro	<b>system:</b> T Caching File syste om a Had	'he Design g, HDFS Fe em Operatio loop URL, 1	of HDFS ederation ons, Hado Reading I	HDFS HDFS op File Data Us	S High A systems ing the 1	Availal , Inter File Sy	oility, The faces, The ystem API
			<b>The Ha</b> nodes Comma Java In Writing	adoop Di and Da and-Line iterface, g Data, I	<b>istribute</b> ta node Interfae Reading Directori	ed Files s s, Block ce, Basic Data fro es, Quer	system: T Caching File syste om a Had ying the I	The Design 5, HDFS Fo 5m Operatio	of HDFS ederation ons, Hado Reading I	HDFS HDFS op File Data Us	S High A systems ing the 1	Availal , Inter File Sy	oility, The faces, The ystem API
			<b>The Ha</b> nodes Comma Java In Writing File Rea	adoop Di and Da and-Line aterface, g Data, I ad, Anato	<b>istribute</b> ta node e Interfac Reading Directori omy of a	ed Files s s, Block ce, Basic Data fro es, Quer File Writ	system: T Caching File syste om a Had ying the I te.	The Design g, HDFS For em Operatio loop URL, 1 File system	of HDFS ederation ons, Hado Reading I , Deleting	HDFS HDFS oop File Data Us g Data,	5 High A systems ing the 1 Data Flor	Availal , Inter File Sy w, Ana	oility, The faces, The ystem API atomy of a
			The Ha nodes Comma Java In Writing File Rea MapRe	adoop Di and Da and-Line iterface, g Data, I ad, Anato cduce: In	istribute ta node e Interfac Reading Directori Directori Dmy of a troducti	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch	System: T Caching File syste om a Had ying the I te. itecture of	The Design F, HDFS F F Operation op URL, 1 File system of map rec	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana	HDFS, HDFS op File Data Us g Data, tomy o	5 High A systems ing the 1 Data Flor f a MapH	Availal , Inter File Sy w, Ana Reduc	bility, The faces, The ystem API atomy of a e Job Run
			The Ha nodes Comm Java In Writing File Rea <b>MapRe</b> Job Su	adoop Di and Da and-Line iterface, g Data, I ad, Anato educe: In bmissior	istribute ta node e Interfae Reading Directori omy of a troducti n, Job In	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati	system: T Caching File syste om a Had ying the I te. iitecture o on, Task	The Design g, HDFS For em Operatio loop URL, 1 File system	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana nt, Task I	HDFS HDFS oop File Data Us g Data, tomy o Executio	5 High A systems ing the 1 Data Flor f a MapF on, Prog	Availal , Inter File Sy w, Ana Reduc ress a	bility, The faces, The ystem API atomy of a e Job Run and Status
			The Ha nodes Comm Java In Writing File Re Job Su Update	adoop Di and Da and-Line iterface, g Data, I ad, Anato educe: In bmissior es, Job C	istribute ta node e Interfac Reading Directori omy of a troducti n, Job In ompletic	ed Files s s, Block ce, Basic Data fro es, Quer <u>File Writ</u> on, Arch itializati on, Failu	system: T Caching File syste om a Had ying the I te. iitecture o on, Task res, Task	The Design , HDFS For m Operation loop URL, File system of map reconstruction Assignment	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana nt, Task I oplication	HDFS , HDFS oop File Data Us g Data, tomy o Executio Master	5 High A systems ing the 1 Data Flor f a MapF on, Prog	Availal , Inter File Sy w, Ans Reduc ress a , Node	bility, The faces, The ystem API atomy of a e Job Run and Status e Managen
			The Ha nodes Comma Java In Writing File Rea Job Su Update Failure MapRe	adoop Di and Da and-Line and-Line terface, g Data, I ad, Anato educe: In bmission es, Job C c, Resour educe Ty	istribute ta node e Interface Reading Directori omy of a troduction, Job In completion rce Mar vpes and	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failu ager Fa <b>1 Forma</b>	system: T Caching File syste om a Had ying the I te. itecture on, Task res, Task ilure, Sh ts: MapR	The Design F, HDFS F Coop URL, 1 File system of map rec Assignmer Failure, Ap uffle and educe Typ	of HDFS ederation ons, Hado Reading I , Deleting duce, Ana nt, Task I oplication Sort, Th pes, The	HDFS, HDFS, HDFS oop File Data Us g Data, tomy o Execution Master e Map Default	5 High A systems ing the 1 Data Flor f a MapF on, Prog Failure Side, T MapRed	Availal , Inter File Sy w, An Reduc ress a , Node he Re duce	pility, The faces, The ystem API atomy of a be Job Run and Status e Manager educeSide Job, Inpu
	Unit: 2		The Ha nodes Comma Java In Writing File Rea Job Su Update Failure MapRe Format	adoop Di and Da and-Line iterface, g Data, E ad, Anato educe: In bmission es, Job C c, Resoun educe Ty ts, Input	istribute ta node e Interface Reading Directori omy of a troducti n, Job In completion rce Mar <b>/pes ano</b> Splits a	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failu nager Fa <b>I Forma</b> nd Reco	system: T Caching File syste om a Had ying the I te. itecture on, Task res, Task ilure, Sh ts: MapR	The Design F, HDFS F om Operation op URL, 1 File system of map rec Assignmer Failure, Ap uffle and	of HDFS ederation ons, Hado Reading I , Deleting duce, Ana nt, Task I oplication Sort, Th pes, The	HDFS, HDFS, HDFS oop File Data Us g Data, tomy o Execution Master e Map Default	5 High A systems ing the 1 Data Flor f a MapF on, Prog Failure Side, T MapRed	Availal , Inter File Sy w, An Reduc ress a , Node he Re duce	pility, The faces, The ystem API atomy of a be Job Run and Status e Manager educeSide Job, Inpu
			The Ha nodes Comma Java In Writing File Rea Job Su Update Failure MapRe Format MapRe	adoop Di and Da and-Line iterface, g Data, I ad, Anato educe: In bmission es, Job C e, Resoun educe Ty ts, Input duce Ap	istribute ta node e Interfac Reading Directori omy of a troducti n, Job In ompletic rce Mar <b>/pes and</b> Splits a plication	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failut ager Fa <b>i Forma</b> nd Recon	system: T Caching File syste om a Had ying the I te. itecture on, Task res, Task ilure, Shi ts: MapR rds, Text	The Design F, HDFS F oop URL, F File system of map rec Assignmer Failure, Ap uffle and educe Typ Input, Out	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana nt, Task I oplication Sort, Th oes, The put Form	HDFS,	High A systems ing the 1 Data Flor f a MapF on, Prog Failure Side, T MapRed xt Outpu	Availal , Inter File Sy w, Ana Reduc ress a , Node he Re duce ut, De	bility, The faces, The ystem API atomy of a bill bob Run and Status e Managen educeSide Job, Input veloping a
			The Ha nodes Comma Java In Writing File Rea Job Su Update Failure MapRe Format MapRe Hadoo	adoop Di and Da and-Line and-Line terface, g Data, I ad, Anato educe: In bmissior es, Job C c, Resour educe Ty ts, Input educe Apj p Ecosy	istribute ta node e Interface Reading Directori omy of a troducti a, Job In ompletic rce Mar <b>ypes and</b> Splits a plication <b>stem ar</b>	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failur nager Fa <b>I Forma</b> nd Recon	system: T Caching File syste om a Had ying the I te. itecture o on, Task res, Task ilure, Shi ts: MapR rds, Text I: Hadoo	The Design The Design The Departure The System The	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana nt, Task I oplication Sort, Th oes, The put Form em comp	HDFS, HDFS oop File Data Us g Data, tomy o Execution Master e Map Default nats, Te	High A systems ing the 1 Data Flor f a MapF on, Prog Failure. Side, T MapRed xt Outpu	Availal , Inter File Sy w, Ans Reduc ress a , Node he Re duce ut, De ulers	bility, The faces, The ystem API atomy of a e Job Run and Status e Manager educeSide Job, Input veloping a -Fair and
			The Ha nodes Comma Java In Writing File Re Job Su Update Failure MapRe Hadooy Capaci	adoop Di and Da and-Line iterface, g Data, I ad, Anato cduce: In bmissior es, Job C c, Resoun cduce Ty ts, Input duce Ap <b>p Ecosy</b> ty, Hado	istribute ta node e Interface Reading Directori omy of a troduction, Job In completion rce Mar <b>/pes and</b> Splits a plication <b>stem ar</b> pop 2.0 1	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failu hager Fa <b>I Forma</b> nd Recon <b>I YARN</b> New Fea	system: T Caching File syste om a Had ying the I te. itecture o on, Task res, Task ilure, Shi ts: MapR rds, Text I: Hadoo	The Design F, HDFS F oop URL, F File system of map rec Assignmer Failure, Ap uffle and educe Typ Input, Out	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana nt, Task I oplication Sort, Th oes, The put Form em comp	HDFS, HDFS oop File Data Us g Data, tomy o Execution Master e Map Default nats, Te	High A systems ing the 1 Data Flor f a MapF on, Prog Failure. Side, T MapRed xt Outpu	Availal , Inter File Sy w, Ans Reduc ress a , Node he Re duce ut, De ulers	bility, The faces, The ystem API atomy of a e Job Run and Status e Manager educeSide Job, Input veloping a -Fair and
			The Ha nodes Comma Java In Writing File Re Job Su Update Failure MapRe Hadoo Capaci YARN,	adoop Di and Da and-Line iterface, g Data, I ad, Anato cduce: In bmission es, Job C c, Resoun cduce Ty ts, Input duce Ap <b>p Ecosy</b> ty, Hado Running	istribute ta node e Interfae Reading Directori omy of a troducti n, Job In ompletion cce Mar <b>/pes and</b> Splits a plication <b>stem ar</b> oop 2.0 1 MRv1 in	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failu ager Fa <b>I Forma</b> nd Recor <b>I Forma</b> New Fea YARN.	system: T Caching File syste om a Had ying the I te. iitecture of on, Task res, Task ilure, Shi ilure, Shi ts: MapR rds, Text J: Hadoo tures Nar	The Design (; HDFS For coop URL, For File system of map reconstruction Assignmer Failure, App uffle and educe Typ Input, Out p ecosystem neNode H	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana nt, Task I oplication Sort, Th bes, The put Form em comp igh Availa	HDFS,	G High A systems ing the E Data Flor f a MapF on, Prog Failure. Side, T MapRed xt Outpu -Sched HDFS Fe	Availal , Inter File S w, An Reduc ress a , Nodo he Ro duce ut, De ulers derat	bility, The faces, The ystem API atomy of a e Job Run and Status e Manager educeSide Job, Input veloping a -Fair and on, MRv2
			The Ha nodes Comma Java In Writing File Re Job Su Update Failure MapRe Hadoo Capaci YARN, No SQ	adoop Di and Da and-Line iterface, g Data, I ad, Anato cduce: In bmission es, Job C c, Resoun cduce Ty ts, Input cduce Ap <b>p Ecosy</b> ty, Hado <u>Running</u> L Databa	istribute ta node e Interfae Reading Directori omy of a otroduction, Job In completion rce Mar <b>/pes and</b> Splits a plication stem ar oop 2.0 1 <u>MRv1 in</u> ases: Rev	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failu ager Fa <b>I Forma</b> nd Recor <b>Id YARN</b> Vew Fea YARN.	system: T Caching File syste om a Had ying the I te. iitecture of on, Task res, Task ilure, Sh ts: MapR rds, Text J: Hadoo tures Nar raditiona	The Design The Design The Depart The System The Sy	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana nt, Task I oplication Sort, Th oplication Sort, The put Form em comp igh Availa	HDFS,	G High A systems ing the E Data Flor f a MapF on, Prog Failure Side, T MapRed Xt Outpu -Sched HDFS Fe	Availal , Inter File S w, An Reduc ress a , Node he Re duce ut, De ulers derati	bility, The faces, The ystem API atomy of a e Job Run and Status e Manager educeSide Job, Input veloping a -Fair and on, MRv2 Columnat
	Unit: 2		The Ha nodes Commi- Java In Writing File Rea Job Su Update Failure MapRe Format MapRe Hadooj Capaci YARN, No SQ Databa	adoop Di and Da and-Line iterface, g Data, I ad, Anato duce: In bmission es, Job C c, Resoun educe Ty ts, Input duce Ap <b>p Ecosy</b> ty, Hado Running L Databa uses, Fail	istribute ta node e Interface Reading Directori omy of a troduction, Job In completion rce Mar <b>/pes and</b> Splits a plication <b>stem ar</b> oop 2.0 I <u>MRv1 in</u> <b>ases</b> : Revo	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failus ager Fa <b>1 Forma</b> nd Recon <b>New Fea</b> YARN. <i>v</i> iew of t 1 reliabil	system: T Caching File syste om a Had ying the I te. itecture on, Task res, Task ilure, Sh ts: MapR rds, Text V: Hadoo tures Nar raditiona ity princi	The Design F, HDFS F or Operation of Operation of map recent Assignmen Failure, Ap uffle and educe Typ Input, Out p ecosystem neNode H I Databases ples, CAP	of HDFS ederation ons, Hado Reading I , Deleting duce, Ana nt, Task I oplication Sort, Th oes, The oplication Sort, Th em comp igh Availa	HDFS,	G High A systems ing the E Data Flor f a MapF on, Prog Failure Side, T MapRed Xt Outpu -Sched HDFS Fe QL Databa	Availal , Inter File S w, An Reduc ress a , Node he Re duce ulers derati	bility, The faces, The ystem APL atomy of a e Job Run and Status e Manager educeSide Job, Input veloping a -Fair and on, MRv2 Columnar o SQL and
			The Ha nodes Comma Java In Writing File Rea Job Su Update Failure MapRe Format MapRe Hadoo Capaci YARN, No SQ Databa NoSQL	adoop Di and Da and-Line iterface, g Data, E ad, Anato cduce: In bmission es, Job C c, Resoun cduce Ty ts, Input duce Ap <b>p Ecosy</b> ty, Hado <u>Running</u> L Databa ases, Fail databas	istribute ta node e Interfae Reading Directori omy of a troducti h, Job In ompletion rce Mar <b>/pes and</b> Splits a plication <b>stem ar</b> oop 2.0 I <u>MRv1 in</u> <b>ases</b> : Rev over and es, <b>Wor</b>	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failur nager Fa <b>I Forma</b> nd Recor <b>I Forma</b> New Fea <u>YARN.</u> <i>i</i> ew of t d reliabil <b>king Me</b>	system: T Caching File syste om a Had ying the I te. itecture o on, Task res, Task ilure, Sh ts: MapR rds, Text J: Hadoo tures Nar raditiona ity princi chanisms	The Design The Design The Depart The System The Sy	of HDFS ederation ons, Hado Reading I , Deleting duce, Ana ht, Task I oplication Sort, Th oes, The put Form em comp igh Availa s, Need for Theorem <b>DB</b> : Over	HDFS,	5 High A systems ing the 1 Data Flor f a MapF on, Prog Failure Side, T MapRee xt Outpu -Sched HDFS Fe QL Datate ences be dvantage	Availal , Inter File Sy w, Ans Reduc ress a , Node he Re duce ut, De ulers derat	bility, The faces, The ystem API, atomy of a e Job Run and Status e Manager educeSide Job, Input veloping a -Fair and on, MRv2; Columnar n SQL and vironment
	Unit: 2		The Ha nodes Comma Java In Writing File Rea Job Su Update Failure MapRe Hadoo Capaci YARN, No SQ Databa NoSQL Data M	adoop Di and Da and-Line and-Line and-Line g Data, I ad, Anato cduce: In bmission es, Job C c, Resoun educe Ty ts, Input duce Ap <b>p Ecosy</b> ty, Hado <u>Running</u> L Databa uses, Fail databas Modelling	istribute ta node e Interfac Reading Directori omy of a troducti n, Job In ompletic rce Mar <b>/pes and</b> Splits a plication <b>stem ar</b> oop 2.0 I <u>MRv1 in</u> <b>ases</b> : Rev over and es, <b>Wor</b> g, Create	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failun ager Fa <b>i Forma</b> nd Recou <b>ind YARN</b> View Fea <u>YARN.</u> view of t d reliabil king Mee e Databas	system: T Caching File syste om a Had ying the I te. itecture o on, Task res, Task ilure, Sh ts: MapR rds, Text J: Hadoo tures Nar raditiona ity princi chanisms se, Drop	The Design F, HDFS F or Operation of Operation File system of map rec Assignmer Failure, Ap uffle and educe Typ Input, Out p ecosystem neNode H I Databases ples, CAP of Mongo	of HDFS ederation ons, Hado Reading I , Deleting duce, Ana ot, Task I oplication Sort, Th oes, The put Form em comp igh Availa s, Need for Theorem <b>DB</b> : Over Create co	HDFS, HDFS, HDFS oop File Data Us g Data, tomy o Executiv Master e Map Default hats, Te onents bility, I or NoSO, Different view, A bollectio	5 High A systems ing the 1 Data Flor f a MapF on, Prog r Failure. Side, T MapRee xt Outpu -Sched HDFS Fe QL Datab ences be dvantage n, Drop	Availal , Inter File S w, Ans Reduc ress a , Node he Re duce ut, De ulers derati	bility, The faces, The ystem API, atomy of a e Job Run and Status e Manager educeSide Job, Input veloping a -Fair and on, MRv2. Columnar n SQL and vironment tion, Data
	Unit: 2		The Ha nodes Comma Java In Writing File Re Job Su Update Failure MapRe Hadoo Capaci YARN, No SQ Databa NoSQL Data M types, Aggreg	adoop Di and Da and-Line and-Line g Data, I ad, Anato g Data, I ad, Anato cduce: In bmissior es, Job C c, Resour cauce Ty ts, Input duce Ap <b>p Ecosy</b> ty, Hado <u>Running</u> L Databas Adatabas Addelling Insert, Q ation	istribute ta node e Interfae Reading Directori omy of a troducti n, Job In completion rce Mar <b>ypes and</b> Splits a plication <b>stem ar</b> oop 2.0 I <u>MRv1 in</u> <b>ases</b> : Rev over and es, <b>Wor</b> g, Create Query, Uj	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failur hager Fa <b>I Forma</b> nd Recor <b>I Forma</b> New Fea YARN. <i>v</i> iew of t I reliabil king Mee Databa odate an	system: T Caching File syste om a Had ying the H te. iitecture of on, Task res, Task ilure, Shi <b>ts</b> : MapR rds, Text <b>V</b> : Hadoo tures Nar raditiona ity princi <b>chanisms</b> se, Drop d Delete	The Design The Design The Design The System of map reconstruction Assignmer Failure, Ap uffle and educe Typ Input, Out p ecosystem neNode H I Databases ples, CAP of Mongo Database, operations	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana nt, Task I oplication Sort, Th oes, The put Form em comp igh Availa s, Need fo Theorem <b>DB</b> : Over Create co , Limiting	HDFS, HDFS oop File Data Us g Data, tomy o Execution Master e Map Default hats, Te onents ibility, 1 or NoSo, Differ view, A pllectio g and So	5 High A systems ing the 1 Data Flor f a MapF on, Prog Failure. Side, T MapRed Xt Outpu -Sched HDFS Fe QL Datate ences be dvantage n, Drop orting re	Availal , Inter File S w, An Reduc ress a , Nodo he Ro duce ut, De ulers derati oases, tween es, Env collec cords	bility, The faces, The ystem API, atomy of a e Job Run and Status e Manager educeSide. Job, Input veloping a -Fair and on, MRv2. Columnar h SQL and vironment tion, Data , Indexing,
	Unit: 2		The Ha nodes Comma Java In Writing File Re Job Su Update Failure MapRe Hadooy Capaci YARN, No SQ Databa NoSQL Data M types, Aggreg Pig: Go	adoop Di and Da and-Line iterface, g Data, I ad, Anato g Data, I ad, Anato cduce: In bmissior es, Job C s, Resoun educe Ty ts, Input duce Ap <b>p Ecosy</b> ty, Hado Running L Databas Adatabas Addelling Insert, C gation enerating	istribute ta node e Interfae Reading Directori omy of a troduction, Job In completion rce Mar <b>ypes and</b> Splits a plication <b>stem ar</b> oop 2.0 H MRv1 in <b>ases</b> : Revo over and es, <b>Wor</b> g, Create Query, Uj	ed Files s s, Block ce, Basic Data fro es, Quer File Writ on, Arch itializati on, Failu hager Fa <b>I Forma</b> nd Recor <b>I Forma</b> New Fea YARN. view of t d reliabil king Mea b Databas odate an les, Cor	system: T Caching File syste om a Had ying the H te. iitecture of on, Task res, Task ilure, Shi <b>ts</b> : MapR rds, Text <b>V</b> : Hadoo tures Nar raditiona ity princi <b>chanisms</b> se, Drop d Delete	The Design The Design The Design The Provide the State The System The Sys	of HDFS ederation ons, Hado Reading I , Deleting luce, Ana nt, Task I oplication Sort, Th oes, The put Form em comp igh Availa s, Need fo Theorem <b>DB</b> : Over Create co , Limiting	HDFS, HDFS oop File Data Us g Data, tomy o Execution Master e Map Default hats, Te onents ibility, 1 or NoSo, Differ view, A pllectio g and So	5 High A systems ing the 1 Data Flor f a MapF on, Prog Failure. Side, T MapRed Xt Outpu -Sched HDFS Fe QL Datate ences be dvantage n, Drop orting re	Availal , Inter File S w, An Reduc ress a , Nodo he Ro duce ut, De ulers derati oases, tween es, Env collec cords	bility, The faces, The ystem API, atomy of a e Job Run and Status e Manager educeSide. Job, Input veloping a -Fair and on, MRv2. Columnar h SQL and vironment tion, Data , Indexing,

	Hive: Comparison with Traditional Databases, HiveQL, Tables, Querying Data, User-Defined
	Functions, Writing a User Defined Functions, Writing a User Defined Aggregate Function.
	Spark: Spark and its Purpose, Components of the Spark Unified Stack, Batch and Real-Time
	Analytics with Apache Spark, Resilient Distributed Dataset, Scala (Object Oriented and
	Functional Programming)
Unit: 5	Machine Learning with Spark: Designing a Machine Learning System, Obtaining, Processing
	and Preparing Data with Spark, Building a Recommendation Engine with Spark, Building a
	Classification Model with Spark, Building a Regression Model with Spark and Building a
	Clustering Model with Spark.
Examination and Eva	luation 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 Tom White, "Ha	doop: The Definitive Guide", Fourth Edition, O'Reilly Media Inc. 2015.

1	Tom White, "Hadoop: The Definitive Guide", Fourth Edition, O'Reilly Media Inc, 2015.
2	Nick Pentreath, —Machine Learning with SparkI, First Edition, Packt Publishing, 2015.
Refe	rence Books:
1	Thilinagunarathne, —Hadoop MapReduce v2 CookbookI, Second Edition, Packet Publishing, 2015.
2	Chuck Lam Mark Davis Aiit Gaddam —Hadoon in Action Manning Publications Company 2016

Chuck Lam, Mark Davis, Ajit Gaddam, —Hadoop in Action<sup>I</sup>, Manning Publications Company, 2016.

	de				Course 7	Fitle			Le	cture			
MTCS333P	ET					Automat			L	ΤI	P Se	emest	ter: III
Version: 1.2				e of App	r <b>oval:</b> 16t	h BoS 17-			4	· ·	0		
	Scheme						S	Scheme of			1	-	
	Periods	: 60	Hrs.							m Scor		100	)
Periods	/ Week	: 4						Inte		aluatio		30	
	Credits	: 4								emeste		70	
Instructio			ture						Exam l	Duratio	n :	3 H	Irs.
Prerequisite(s):		Intellige	nce										
Course Objectiv													
1. Understand t													
2. Explain abou							in memory						
<ol> <li>Model the w</li> <li>Interpret the</li> </ol>						-5.							
Course Outcom		at can be	used to	trigger ad	cuons.								
COs No.	es (CO).				Statem	ont					Ларре	d Dro	aram
COS NO.					Statem	ciit					Outco		•
CO <sub>1</sub>	Describe	RPA wh	ere it ca	n he anr	lied and	how it's i	mplemente	he				h, PO	
							-		lation				
	Describe techniqu		erent typ	les of val	iables, C	UNITOI FIC	ow and dat	a mampu	auon		PO	2, <b>P</b> C	<b>J</b> 3
			handlo +1	he Hear I	Eventa	d various	s types of E	vention	e and		DΟ	4, PC	) <u>-</u>
	strategie				svents al	iu vai ious	s types of E	aception	s allu		PU	4, PC	15
			)enlovm	ent of th	e Robot	and to ma	intain the	connectio	າກ		PO <sub>4</sub> , I	20~	PO
<b>PO</b> <sub>1</sub> - Engineering 1			1 5										
problems, <b>PO</b> <sub>5</sub> - Me													
or team work, <b>PO</b> <sub>10</sub>										100 20			arriada
							ith progran						
Course	DO	DO		DO	DO	DO		DO	DO	DO	D	2	DO
Outcomes	PO <sub>1</sub>	$PO_2$	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	$PO_6$	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>10</sub>		O <sub>11</sub>	<b>PO</b> <sub>12</sub>
CO <sub>1</sub>	3	2											
$CO_2$		2	2										
CO <sub>3</sub>				0	-								
				2	2								
CO <sub>4</sub>				2	2				2	3			
CO <sub>4</sub>			1 -	2		Significan	ıt; 3 – Stroi	ng	2	3			
CO <sub>4</sub> Detailed Conten	ts:			2 • Reasona	ıble; 2 – 1	•••		0					
	ts:		DUCTIO	2 Reasona	<b>ible; 2 – </b> ROBOTI	C PROC	ESS AUT	OMATION	l: Sco	ope an			
	ts:	automa	DUCTIO ation, Ro	2 Reasona N TO botic pro	a <b>ble; 2 – </b> ROBOTI ocess au	C PROC tomation	ESS AUTO - What car	OMATION n RPA doʻ	N: Sco ?, Bene	ope an efits of 1	RPA, C	Comp	onents
	ts:	automa of RPA,	DUCTIO ation, Ro , RPA pla	2 • <b>Reasona</b> • N TO • botic pro-	<b>able; 2 – 5</b> ROBOTI ocess au The futu	C PROC tomation re of auto	ESS AUTO - What car omation. RI	OMATION n RPA do PA BASICS	N: Sco ?, Bene S: Histe	ope an efits of I ory of A	RPA, ( utoma	Comp tion	onents - What
Detailed Conten	ts:	automa of RPA, is RPA	DUCTIO ation, Ro , RPA pla - RPA va	2 Reasona N TO botic pro- tforms, ' s Autom	<b>Ible; 2 – </b> ROBOTI ocess au The futu ation – I	C PROC tomation re of auto Processes	ESS AUTO - What car mation. RF & Flowcha	OMATION n RPA do PA BASICS arts - Pro	V: Sco ?, Bene S: Histo ogrami	ope an efits of I ory of A ning Co	RPA, ( utoma onstrue	Comp tion ets in	onents - Wha RPA -
	ts:	automa of RPA, is RPA What F	DUCTIO ation, Ro , RPA pla - RPA va Processe	2 • <b>Reasond</b> •N TO •botic pro- tforms, ' s Autom s can be	ROBOTI ocess au The futu ation - I	C PROC tomation re of auto Processes ted - Typ	ESS AUTO - What car omation. RF & Flowcha bes of Bots	OMATION n RPA do' PA BASICS arts - Pro arts - Worklo	V: Sco ?, Bene S: Histo ogrami pads w	ope an efits of I ory of A ning Co hich ca	RPA, ( utoma onstrue in be a	Comp tion ets in uton	onents - Wha RPA - nated -
Detailed Conten	ts:	automa of RPA, is RPA What F RPA Ad	DUCTIO ation, Ro , RPA pla - RPA v Processes lvanced (	2 Reasona N TO botic pro- ttforms, ' s Autom s Can be Concept	ROBOTI ocess au The futu ation - I Automa s - Stanc	C PROC tomation re of auto Processes ted - Typ lardizatio	ESS AUTO - What car omation. RF & Flowcha bes of Bots n of proces	OMATION n RPA do' PA BASICS arts - Pro arts - Worklo sses - RPA	J: Sco ?, Bene 5: Histo ogram pads w A Deve	ope an efits of I ory of A ning Co hich ca lopmen	RPA, ( utoma onstrue in be a it metl	Comp tion cts in uton nodol	onents - What RPA - nated - ogies -
Detailed Conten	ts:	automa of RPA, is RPA What F RPA Ad Differe	DUCTIO ation, Ro , RPA pla - RPA v: Processe: lvanced ( nce fron	2 Reasona botic pro- tforms, ' s Autom s can be Concept n SDLC -	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic	C PROC tomation re of auto Processes ted - Typ lardizatio	ESS AUTO - What car omation. RF & Flowcha bes of Bots n of proces flow archite	OMATION n RPA do' PA BASICS arts - Pro arts - RPA sses - RPA ecture - I	J: Sco ?, Bene 5: Histo ogrami oads w A Deve RPA bu	ope an efits of l ory of A ning Co hich ca lopmen siness o	RPA, ( automa onstrue in be a it metl case -	Comp tion ets in uton nodol RPA '	onents - What RPA - nated - ogies - Team -
Detailed Conten	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces	DUCTIO ation, Ro , RPA pla - RPA va Processes lvanced o nce from s Design	2 Reasona botic pro- atforms, ' s Autom s can be Concept n SDLC - n Docum	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic ent/Sol	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des	ESS AUTO - What car omation. RF & Flowcha bes of Bots n of proces flow archit sign Docur	OMATION n RPA do' PA BASICS arts - Pro arts - Pro arts - Pro arts - Pro arts - Pro sses - RPA ecture - I nent - Ir	J: Sco ?, Bene 5: Histo ogrami oads w A Deve RPA bu	ope an efits of l ory of A ning Co hich ca lopmen siness o	RPA, ( automa onstrue in be a it metl case -	Comp tion ets in uton nodol RPA '	onents - What RPA - nated - ogies - Team -
Detailed Conten	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces Risks &	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced ( nce fron s Design Challen	2 Reasona botic pro- atforms, ' s Autom s can be Concept n SDLC - n Docum ges with	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic ent/Sol RPA - R	C PROC tomation re of auto Processes ted - Typ lardizatio e control f ution Des PA and en	ESS AUTO - What car omation. RF & Flowcha bes of Bots n of proces flow archite sign Docur nerging eco	OMATION n RPA do' PA BASICS arts - Pro s - Worklo sses - RPA ecture - I nent - Ir psystem.	J: Sco ?, Bene 3: Histo ogramn oads w A Deve RPA bu adustri	ope an fits of l ory of A ning Co hich ca lopmer siness o es best	RPA, C automa onstrue in be a at metl case - case - suite	Comp ition ets in nuton nodol RPA <sup>7</sup> d for	onents - What RPA - nated - ogies - Team - RPA -
Detailed Conten	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces Risks & RPA TC	DUCTIO ation, Ro , RPA pla - RPA va Processes lvanced of nce from s Design Challen DOL INT	2 Reasonation botic pro- tiforms, ' s Autom s can be Concept n SDLC - n Docum ges with 'RODUC'	ROBOTI ocess au The futu ation - I Automa s - Stance Robotic nent/Sol RPA - R TION AN	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des PA and en ID BASICS	ESS AUTO - What car omation. RI & Flowcha bes of Bots n of proces flow archita sign Docur nerging eco S: Introduc	OMATION n RPA do' PA BASICS arts - Pro arts - Pro volta - Pro secture - I ecture - I nent - Ir osystem. ction to R	J: Sco ?, Bene S: Histo ogram Dads w A Deve RPA bu ndustri PA To	ope an fits of l ory of A ning Co hich ca lopmen siness o es best ol - Th	RPA, C utoma onstruct in be a nt meth case - c suite suite e User	Comp ition ets in nodol RPA ' d for	onents - Wha RPA - nated - ogies - Team - RPA - rface -
Detailed Conten	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces Risks & RPA TC Variabl	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced of nce from s Design Challen DOL INT es - Ma	2 Reasonation botic pro- tiforms, ' s Autom s can be Concept n SDLC - n Docum ges with 'RODUC' naging V	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic ent/Sol RPA - R TION AN Variables	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des PA and en ID BASICS	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of proces flow archita sign Docur nerging eco S: Introduc ng Best Pra	OMATION n RPA do' PA BASICS arts - Pro sess - RPA ecture - I nent - Ir posystem. ction to R actices -	J: Sco ?, Bene S: Histo ogrami oads w A Deve RPA bu adustri PA To The V	ope an effits of l ory of A ning Co hich ca lopmen siness of es best ol - Th 'ariable	RPA, ( utoma onstrue in be a it metl case - suite suite e User s Pane	Comp ition ets in utom nodol RPA ' d for d for Inte	onent: - Wha RPA nated ogies Team RPA rface Generic
Detailed Conten	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces. Risks & RPA TO Variabl Value	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced ( nce fron s Design Challen DOL INT es - Ma Variables	2 Reasona botic pro- tiforms, ' s Autom s can be Concept n SDLC - n Docum ges with 'RODUC' naging V s - Text	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic ent/Sol <u>RPA - R</u> TION AN Variables Variabl	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des PA and en ID BASICS - Namir es - Tru	ESS AUTC - What can omation. RF & Flowcha bes of Bots n of proces flow archita sign Docur nerging ecc S: Introduc ng Best Pra e or False	OMATION n RPA do' PA BASICS arts - Pro sectore - I nent - In nent - In osystem. ction to R actices - Variable	J: Sco ?, Bene S: Histo ogrami oads w A Deve RPA bu adustri PA To The V s - N	ope an effits of l ory of A ning Co hich ca lopmer siness of es best ol - Th ariable umber	RPA, ( automa onstrue in be a at metl case - c suite e User s Pane Variab	Comp ition ets in nodol RPA ' d for · Inte el - C oles -	onent: - Wha RPA nated ogies Feam RPA rface Generic Array
Detailed Conten	ts:	automa of RPA, is RPA What F RPA Ad Differe Process Risks & RPA TO Variabl Value	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced ( nce from s Design Challen DOL INT es - Ma Variables es - Dat	2 Reasona botic pro- tforms, ' s Autom s Can be Concept n SDLC - n Docum ges with 'RODUC' naging V s - Text e and Ti	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic nent/Sol RPA - R TION AN Variables Variabl me Varia	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des PA and en ID BASICS - Namir es - Tru- bles - Da	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of proces flow architt sign Docur nerging eco S: Introduco g Best Pra e or False ta Table Va	OMATION n RPA do' PA BASICS arts - Pro arts - Pro secture - I ecture - I nent - Ir osystem. oction to R actices - Variable ariables -	V: Sco ?, Bene S: Histo ogrami oads w A Deve RPA bu ndustri PA To The V s - N Mana	ppe an fits of l ory of A ning Co hich ca lopmer siness of es best ol - Th ariable umber ging Arg	RPA, ( utoma onstrue in be a it meth case - c suite e User s Pane Variah gumen	Comp ition ets in nodol RPA ' d for Inte el - C bles - ts - N	onent: - Wha RPA nated ogies Feam RPA rface Generic Array Naming
Detailed Conten Unit: 1	ts:	automa of RPA, is RPA What F RPA Ad Differe Process Risks & RPA TC Variabl Value Variabl Best Pr	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced o nce from s Design Challen DOL INT es - Ma Variables es - Dat ractices	2 Reasona N TO botic pro- atforms, ' s Autom s Autom s Concept n SDLC - n Docum ges with 'RODUC' naging V s - Text e and Tir - The Au	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic ent/Sol RPA - R TION AN Variables Variabl me Varia	C PROC tomation re of auto Processes ted - Typ lardizatio c control f ution Des PA and en ID BASICS - Namir es - Tru- bles - Da s Panel -	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of proces flow archito sign Docur nerging eco S: Introduco g Best Pra e or False ta Table Va Using Arg	OMATION n RPA do' PA BASICS arts - Pro sectore - I ecture - I nent - Ir osystem. ction to R actices - Variable ariables - uments -	N: Sco S: Bene S: Histo ogrammo oads w A Deve RPA bund dustri PA To The V S - N Manag About	ope an effits of l ory of A ning Co hich ca lopmer siness of es best ol - Th 'ariable umber ging Arg i Impor	RPA, ( automa onstruc- in be a at metl case - suite e User s Pane Variat gumen ted Na	Comp tion ets in nodol RPA d for l for l for l - C bles - ts - N mesp	onent: - Wha RPA ogies Team RPA rface Generic Array Naming Daces
Detailed Conten	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces Risks & RPA TC Variabl Value Variabl Best Pr Import	DUCTIO ation, Ro , RPA pla - RPA v Processes lvanced o nce fron s Design Challen DOL INT es - Ma Variables es - Dat ractices ing New	2 Reasona botic pro- atforms, ' s Autom s can be Concept n SDLC - n Docum ges with 'RODUC' naging ' s - Text e and Ti - The An Namesp	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic ent/Sol RPA - R TION AN Variables Variables variables cumenta	C PROC tomation re of auto Processes ted - Typ lardizatio c control f ution Des PA and en ID BASICS - Namir es - Tru- bles - Da s Panel - ontrol Flor	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of proces flow archito sign Docur nerging eco S: Introduco ng Best Pra e or False ta Table Va Using Arg w - Contro	OMATION n RPA do' PA BASICS arts - Pro secture - I ecture - I nent - Ir osystem. ction to R actices - Variable ariables - uments - I Flow Int	N: Sco P: Bene S: Histo pgramm pads w A Deve RPA bund dustri PA To The V s - N Manag About roduc	ope an fits of l ory of A ning Cc hich ca lopmer siness o es best ol - Th Yariable umber ging Arg z Impor tion - If	RPA, G automa onstruc- in be a at meth case - suite e User s Pane Variat gumen ted Na Else S	Comp tion ets in nutom nodol RPA ' d for Inte el - C bles - ts - N mesp taten	onent: - Wha RPA ogies Feam RPA rface Generic Array Naming paces nents
Detailed Conten Unit: 1	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces Risks & RPA TO Variabl Value Variabl Best Pr Import Loops	DUCTIO ation, Ro , RPA pla - RPA va Processes lvanced of nce from s Design Challen OOL INT es - Ma Variables es - Dat ractices ing New - Advand	2 Reasonation N TO botic pro- atforms, ' s Autom s can be Concept a Docum ges with 'RODUC' naging ' s - Text e and Ti - The An Namesp ced Con	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic ent/Sol RPA - R TION AN Variables Variables variables c Variabl me Varia rgument vaces- Co trol Flow	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des PA and en ID BASICS - Namir es - Tru- bles - Da s Panel - ontrol Flov - Seque	ESS AUTO - What car omation. RI & Flowcha bes of Bots n of proces flow archite sign Docur nerging eco S: Introduco g Best Pra e or False ta Table Va Using Arg w - Contro mces - Flo	OMATION n RPA do' PA BASICS arts - Pro secture - I contone - In posystem. ction to R actices - variables ariables - uments - I Flow Int wcharts	N: Sco P: Bene S: Histo pgrammods we A Deve RPA but dustri PA To The V S - N Manag About croduc - About	ope an fits of 1 ory of A ning Cc hich ca lopmer siness o es best ol - Th Yariable umber ging Arg : Impor tion - If t Conti	RPA, G automa onstruc- in be a at meth case - suite suite e User s Pane Variah gumen ted Na i Else S col Flo	Comp tion ets in nutor nodol RPA ' d for Inte el - C bles - ts - N mesp taten w - C	onent: - Wha RPA ogies Team RPA rface Generic Array Naming paces nents Contro
Detailed Conten Unit: 1	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces Risks & RPA TO Variabl Best Pr Import Loops Flow A	DUCTIO ation, Ro , RPA pla - RPA va Processes lvanced of nce from s Design Challen DOL INT es - Ma Variables es - Dat ractices ing New - Advance	2 Reasona N TO botic pro- atforms, ' s Autom s can be Concept n SDLC - n Docum ges with 'RODUC' naging V s - Text e and Ti - The Au Namesp ced Con - The A	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic ent/Sol RPA - R FION AN Variables Variables Carables control Flow ssign Ac	C PROC tomation re of auto Processes ted - Typ lardizatio c control f ution Des PA and en ID BASICS - Namir es - Tru- bles - Da s Panel - ontrol Flov - Seque tivity - T	ESS AUTO - What car omation. RI & Flowcha bes of Bots n of proces flow archite sign Docur nerging ecc S: Introduc ng Best Pra e or False ta Table Va Using Arg w - Contro nces - Flo he Delay A	OMATION n RPA do' PA BASICS arts - Pro secture - I nent - Ir osystem. ction to R actices - Variable ariables - uments - il Flow Int wcharts - Activity -	V: Sco ?, Bene S: Histo ogramm Dads w A Deve RPA bu dustri PA To The V S - N Manag About croduc - About The D	ope an fits of l ory of A ning Cc hich ca lopmer siness of es best ol - Th Yariable umber ging Arg Impor tion - If t Contu-	RPA, ( automa onstruc- in be a at meth case - suite suite e User s Pane Variat gumen ted Na Else S col Flo e Activ	Comp tion tots in nutom nodol RPA ' d for Inte l - C bles - ts - N mesp taten w - C vity -	onents - Wha RPA - nated - ogies - Team - RPA - rface - Generic - Array Naming paces - nents - Contro The I
Detailed Conten Unit: 1	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces Risks & RPA TO Variabl Best Pr Import Loops Flow A Activity	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced on nce from s Design Challen DOL INT es - Ma Variables es - Dat ractices ing New - Advand ctivities y - The	2 Reasona botic pro- atforms, ' s Autom s can be Concept a SDLC - a Docum ges with 'RODUC' naging V s - Text e and Tii - The Au Namesp ced Con - The A Switch	ROBOTI ocess au The futu ation - I Automa s - Stance Robotic ent/Sol <u>RPA - R</u> TION AN Variables Variables variables c Variabl me Varia rguments baces- Co trol Flow ssign Ac	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des PA and en ID BASICS - Namir es - Tru- bles - Da s Panel - ontrol Flow - Seque tivity - T - The W	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of proces flow archita sign Docur nerging eco S: Introduc ng Best Pra e or False ta Table Va Using Arg w - Contro ences - Flo the Delay A hile Activit	OMATION n RPA do' PA BASICS arts - Pro secture - I nent - Ir posystem. ction to R actices - Variable ariables - uments - l Flow Int wcharts - Activity - The	V: Sco ?, Bend S: Histo ogramm bads w A Deve RPA bu dustri PA To The V s - N Manaş About roduc - Abou The D For E	ope an effits of l ory of A ning Cc hich ca lopmen siness of es best ol - Th ariable umber ging Arg igng Arg igng Arg ing Arg	RPA, G automa onstruc- in be a at meth case - suite suite e User s Pane Variat gumen ted Na Else S col Flo e Activity -	Comp tion tots in nutom nodol RPA ' d for Inte l - C bles - ts - N mesp taten w - C vity - - The	onents - Wha RPA - ogies - Team - RPA - rface - Generic - Array Naming paces - nents - Contro The I e Breal
Detailed Conten Unit: 1	ts:	automa of RPA, is RPA What F RPA Ad Differe Process Risks & RPA TO Variabl Value Variabl Best Pr Import Loops Flow A Activity	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced once from s Design Challen DOL INT es - Ma Variables es - Dat ractices ing New - Advand ctivities y - The y - Data	2 Reasona botic pro- tiforms, ' s Autom s can be Concept n SDLC - n SDLC -	ROBOTI ocess au The futu ation - I Automa s - Stance Robotic RPA - R FION AN Variables Variables Variables variables troi Flow ssign Ac Activity ation - I	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des <u>PA and en</u> ID BASICS - Namir es - Tru- bles - Da s Panel - ontrol Flov - Seque tivity - T - The W Data Mani	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of proces flow archita sign Docurn nerging eco S: Introduce g Best Pra e or False ta Table Va Using Arg w - Contro ences - Flo he Delay A hile Activiti pulation In	OMATION n RPA do' PA BASICS arts - Pro sectore - I ecture - I nent - In poystem. ction to R actices - Variables ariables - uments - Uriables ariables - uments - Activity - ty - The attroduction	J: Sco ?, Bend S: Histo ogramm bads w A Deve RPA bu dustri PA To The V s - N Manaş About roduc - Abou The D For E on - Sco	ope an effits of l ory of A ning Co hich ca lopmen siness of es best ol - Th ariable umber ging Arg ing Arg ing Arg ing Arg control tion - If t Control o While ach Act alar van	RPA, C utoma onstruc- in be a t meth case - s suiter e User s Pane Variat gumen ted Na Else S col Flo e Activ civity - riables	Comp tion cts in nutom nodol RPA ' d for Inte l - C bles - ts - N mesp tatem w - C vity - - The , colle	onents - What RPA - bated - ogies - Team - RPA - Generic - Array Naming baces - nents - Contro The It - Break
Detailed Conten Unit: 1	ts:	automa of RPA, is RPA What F RPA Ad Differe Process Risks & RPA TC Variabl Value Variabl Best Pr Import Loops Flow A Activity and Ta	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced of nce from s Design Challen OOL INT es - Ma OOL INT es - Ma Variables es - Data ractices ing New - Advand ctivities y - The y - Data bles - Te	2 Reasona botic pro- tiforms, ' s Autom s can be Concept n SDLC - n SDLC -	ROBOTI ocess au The futu ation - I Automa s - Stance Robotic ent/Sol RPA - R TION AN Variables Variables variables variables trol Flow ssign Ac Activity ation - I pulation	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des <u>PA and en</u> ID BASICS - Namir es - Tru- bles - Da s Panel - ontrol Flor - Seque tivity - T - The W Data Mani - Data Ma	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of proces flow archit sign Docur nerging eco S: Introduco g Best Pra e or False ta Table Va Using Arg w - Contro nces - Flo he Delay A hile Activiti pulation In unipulation	OMATION n RPA do' PA BASICS arts - Pro arts - Pro secture - I ecture - I nent - In osystem. ction to R actices - Variables ariables - uments - Uariables - uments - l Flow Int wcharts Activity - ty - The utroductio - Gather	J: Sco ?, Bene S: Histo ogrami oads w A Deve RPA bu dustri PA To The V s - N Manaş About roduc - Abou The E For E on - Sco ing an	ppe an effits of l ory of A ning Cc hich ca lopmer siness of es best ol - Th ariable umber ging Arg limpor tion - If tt Contr o While ach Act alar van 1 Assem	RPA, ( utoma onstrue in be a it meth case - suite e User s Pane Variat gumen ted Na Else S col Flo e Activ civity riables ibling	Comp tion ets in autom hodol RPA ' d for Inte el - C bles - ts - N imesp taten w - C vity - vity - the , colle	onents - What RPA - nated - ogies - Team - RPA - rface - Generic Array Naming Daces - nents - Contro The It Break ections
Detailed Conten Unit: 1	ts:	automa of RPA, is RPA What F RPA Ad Differe Process Risks & RPA TO Variabl Value Variabl Best Pr Import Loops Flow A Activity and Ta ADVAN	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced of nce from s Design Challen OOL INT es - Ma Variables es - Data ractices ing New - Advand ctivities y - The y - Data <u>bles - Te</u> ICED AU	2 Reasona botic pro- tiforms, ' s Autom s can be Concept n SDLC - n Docum ges with 'RODUC' naging ' s - Text e and Ti - The Ar Namesp ced Con - The A Switch Manipul ext Manipul	ROBOTI ocess au The futu ation - I Automa s - Stance Robotic ent/Sol <u>RPA - R</u> FION AN Variables Variables variables variables control Flow ssign Ac Activity ation - I <u>pulation</u>	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des <u>PA and en</u> ID BASICS c - Namir es - Tru- bles - Da s Panel - patrol Flor 7 - Seque tivity - T - The W Data Mani <u>- Data Ma</u> ICEPTS &	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of proces flow architt sign Docur nerging ecco S: Introduco g Best Pra e or False ta Table Va Using Argo w - Contro nces - Flo he Delay A hile Activiti pulation In <u>nipulation</u> TECHNIQ	OMATION n RPA do' PA BASICS arts - Pro arts - Pro secture - I ecture - I nent - Ir osystem. ction to R actices - variables ariables - uments - l Flow Int wcharts - Activity - ty - The atroduction <u>- Gather</u> QUES: Rec	J: Sco ?, Bene S: Histo pgrammods we adustrice PA but PA To The V S - N Manag About roduc - About The D For E pon - Sco ing and ording	ppe an effits of l ory of A ning Cc hich ca lopmer siness of es best ol - Th ariable umber ging Arg i Impor tion - If t Contro o While ach Act alar van <u>d Assen</u> i Introd	RPA, ( utoma onstrue in be a it metl case - suite suite e User s Pane Variat gumen ted Na Else S col Flo e Activ civity riables <u>ibling</u> uction	Comp tion cts in nutom nodol RPA ' d for Inte el - C bles - ts - N mesp taten w - C vity - - The , colle Data - Bas	onents - What RPA - nated - ogies - Team - RPA - rface - Generic Array Naming Daces - nents - Contro The It Break ections
Detailed Conten Unit: 1 Unit: 2	ts:	automa of RPA, is RPA What F RPA Ad Differe Process Risks & RPA TC Variabl Value Variabl Best Pr Import Loops Flow A Activity and Tai ADVAN Deskto	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced of nce from s Design Challen OOL INT es - Ma Variables es - Dat ractices ing New - Advance ctivities y - The y - Data bles - Te ICED AU p Recor	2 Reasona botic pro- tiforms, ' s Autom s can be Concept n SDLC - n Docum ges with RODUC' naging ' s - Text e and Ti - The An Namesp ced Con - The A Switch Manipul ext Manipul ding - V	ROBOTI ocess au The futu ation - I Automa s - Stance Robotic ent/Sol <u>RPA - R</u> TION AN Variables Variables Variables Variables variables control Flow ssign Ac Activity ation - I pulation ION CON	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des PA and en ID BASICS - Namir es - Tru- bles - Da s Panel - ontrol Flor - Seque tivity - T - The W Data Mani - Data Ma ICEPTS & ording -	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of process flow archite sign Docurn nerging ecco S: Introduco S: I	OMATION n RPA do' PA BASICS arts - Pro sectore - I nent - Ir osystem. ction to R actices - Variables ariables - uments - l Flow Int wcharts - Activity - ty - The troduction - Gather QUES: Rec tput Metl	V: Sco ?, Bene S: Histo ogramm oads w A Deve RPA bu adustri PA To The V s - N Manag About roduc - About For E for E on - Sco ing and ording nods -	ppe an effits of 1 ory of A ning Cc hich ca lopmer siness of es best ol - Th 'ariable umber ging Arg : Impor tion - If t Contu- ion - If t Contu- contu- contu- contu- t Contu- contu	RPA, ( utoma onstruc- in be a it meth case - suite e User s Pane Variah gumen ted Na Else S col Flo e Activity riables <u>ibling</u> uction n Scra	Comp tion cts in nutom hodol RPA ' d for Inte el - C bles - ts - N mesp tatem w - C vity - Vity - tatem v - The , colle Data - Bas ping	onents - What RPA - ogies - Team - RPA - RPA - Generic - Array Naming Daces - nents - Control The If e Break ections sic and - Data
Detailed Conten Unit: 1	ts:	automa of RPA, is RPA What F RPA Ad Differe Proces Risks & RPA TO Variabl Value Variabl Best Pr Import Loops Flow A Activity Activity and Tal ADVAN Deskto Scrapin	DUCTIO ation, Ro , RPA pla - RPA vs Processes lvanced of nce from s Design Challen DOL INT es - Ma Variables es - Dat ractices ing New - Advand ctivities y - The y - Data bles - Te ICED AU p Recor- ng - Scra	2 Reasona N TO botic pro- atforms, ' s Autom s can be Concept a Docum ges with 'RODUC' naging ' r Tocum a and Ti - The Ar Namesp ced Con - The A Switch Manipul ext Manipul ding - V aping ad	ROBOTI ocess au The futu ation - I Automa s - Stanc Robotic ent/Sol RPA - R TION AN Variables Variables Variables Variables counces - Co trol Flow ssign Ac Activity ation - I pulation ION CON Veb Rec vanced	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des PA and en ID BASICS - Namir es - Tru- bles - Da s Panel - ontrol Flor - Seque tivity - T - The W Data Mani - Data Ma NCEPTS & ording - technique	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of process flow architus sign Docurn nerging ecc S: Introduce ag Best Pra e or False ta Table Va Using Arg w - Contro ences - Flo the Delay A hile Activiti pulation In mipulation TECHNIQ Input/Out	OMATION n RPA do' PA BASICS arts - Pro- sectore - I nent - Ir osystem. ecture - I nent - Ir osystem. ection to R actices - Variable ariables - uments - I Flow Int wcharts - Activity - The troduction - Gather QUES: Reconstruction to Sector 2007 - Def	V: Sco ?, Bene S: Histo ogramm oads w A Deve RPA bu adustri	ppe an effits of 1 pry of A ning Cc hich ca lopmer siness of es best ol - Th ariable umber ging Arg i Impor tion - If t Contri- to While ach Act calar van <u>d Assem</u> i Introd Screen and Ass	RPA, G utoma onstruc- in be a at meth case - suite e User s Pane Variah gumen ted Na Else S col Flo e Activ ivity - riables abling uction n Scra essing	Comp tion cts in nutom nodol RPA ' d for Inte l - C bles - ts - N mesp taten w - C vity - The , colle Data ping Sele	onents - What RPA - ogies - Team - RPA - Generic - Array Vaming Daces - nents - Control The If Break ections sic and - Data ctors -
Detailed Conten Unit: 1 Unit: 2	ts:	automa of RPA, is RPA What F RPA Ad Differe Process Risks & RPA TO Variabl Value Variabl Best Pr Import Loops Flow A Activity Activity and Tal ADVAN Deskto Scrapir Custon	DUCTIO ation, Ro , RPA pla - RPA v Processes lvanced on s Design Challen DOL INT es - Ma Variables es - Dat ractices ing New - Advand ctivities y - The y - Data bles - Te ICED AU p Recorn ng - Scra nization	2 Reasonation N TO botic pro- atforms, ' s Autom s can be Concept a Docum ges with 'RODUC' naging 'V s - Text e and Ti - The An Namesp ced Con - The A Switch Manipul ext Manipul croMATT ding - V aping ad - Debug	ROBOTI ocess au The futu ation - I Automa s - Stance Robotic ent/Sol RPA - R TION AN Variables Carables TION AN Variables Carable	C PROC tomation re of auto Processes ted - Typ lardizatio control f ution Des PA and en ID BASICS - Namir es - Tru- bles - Da bles - Da s Panel - ontrol Flor - Seque tivity - T - The W Data Mani - Data Ma NCEPTS & ording - technique ynamic Se	ESS AUTO - What can omation. RF & Flowcha bes of Bots n of process flow archite sign Docurn nerging ecco S: Introduco S: I	OMATION n RPA do' PA BASICS arts - Pro- arts - Pro- sectore - I nent - Ir osystem. ction to R actices - Variable ariables - uments - I Flow Int wcharts - Activity - The troduction - Gather QUES: Rec- tput Methors - Def Partial Sel	V: Sco ?, Bene S: Histo pgramm pads w A Deve RPA but dustri PA To The V S - N Manag About roduc - About The E For E on - Sco ing and ording aectors	ppe an fits of l ory of A ning Cc hich ca lopmer siness of es best ol - Th Yariable umber ging Arg i Impor tion - If t Contro o While ach Act alar van <u>I Assen</u> i Introd Screen and Ass - RPA (	RPA, G utoma onstruc- in be a at meth case - suite e User s Pane Variab gumen ted Na Else S col Flo e Activ civity - riables abling uction n Scra essing Challer	Comp tion tots in nutom nodol RPA ' d for Inte l - C bles - ts - N mesp taten w - C vity - The , colle Data ping Sele- nge -	onents - What RPA - ogies - Team - RPA - rface - Generic Array Vaming baces - nents - Control The If Break ections - Data ctors - Image,

		based automation - Keyboard based automation - Information Retrieval - Advanced Citrix
		Automation challenges - Best Practices - Using tab for Images - Starting Apps - Excel Data
		Tables & PDF - Data Tables in RPA - Excel and Data Table basics - Data Manipulation in excel
		- Extracting Data from PDF - Extracting a single piece of data - Anchors - Using anchors in
		PDF.
		HANDLING USER EVENTS & ASSISTANT BOTS, EXCEPTION HANDLING: What are assistant
		bots? - Monitoring system event triggers - Hotkey trigger - Mouse trigger - System trigger -
		Monitoring image and element triggers - An example of monitoring email - Example of
	Unit: 4	monitoring a copying event and blocking it - Launching an assistant bot on a keyboard event.
		EXCEPTION HANDLING: Debugging and Exception Handling - Debugging Tools - Strategies
		for solving issues - Catching errors.
		DEPLOYING AND MAINTAINING THE BOT: Publishing using publish utility - Creation of
	Unit: 5	Server - Using Server to control the bots - Creating a provision Robot from the Server -
	Unit: 5	Connecting a Robot to Server - Deploy the Robot to Server - Publishing and managing
		updates - Managing packages - Uploading packages - Deleting packages
Exan	nination and Evalua	ation Pattern: It include both internal evaluation (30 marks) comprising two class sessional
exan	ns/ assignments/ qu	uiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
exan	nination.	
Text	Books:	
1		, "Learning Robotic Process Automation", Packt Publishing, 2018.
2		ecca Dilla, Heidi Jaynes, Lauren Livingston, "Introduction to Robotic Process Automation: a
	Primer", Institute o	of Robotic Process Automation,1st Edition 2015.
Refe	rence Books:	
1		Robotic Process Automation: Guide to Building Software Robots, Automate Repetitive Tasks &
		onsultant", Independently Published, 1st Edition 2018.
2		," Robotic Process Automation Tools, Process Automation and their benefits: Understanding
	RPA and Intelligent	t Automation", Consulting Opportunity Holdings LLC, 1st Edition 2018.

	le		<u> </u>		Course T		<u> </u>			ture	Sem	ester:
MTCS334PI	ET					nguage P		g	L	T P		II
Version: 1.2	0.1	C T		of Appr	oval: 16th	h BoS 17-1		0.1	4	0 0		
	Scheme Periods	T T						Scheme	of Examin Maximui		. 1	20
	s/Week	: 4	Hrs.					In	ternal Eva		: 3	00
Perious	Credits	: 4						111		emester	: 7	
Instructio			ture							ouration		Hrs.
Prerequisite(s): C				d Databa	ase				EAum E	uration	. 0	111.5.
Course Objectives		<u> </u>		a Datase								
1. To understand		language	e proces	sing and								
2. To learn how						P.						
3. To get acquain	nted with	the algo	orithmic	descript	ion of th	e main laı	nguage le	vels: mor	phology,	syntax, se	emantic	s, and
pragmatics, as												
4. To conceive b		nowledg	ge repres	entation	ı, inferen	ce, and re	elations t	o the arti	ficial inte	lligence.		
Course Outcomes	s (CO):											
COs No.					Stateme	nt					bed Pro	
<u> </u>	TT. I	1						1			comes (	/
					cessing a	nd learn l	now to ap	ріу		1	<b>PO</b> 1, <b>PO</b> 2	2
CO <sub>2</sub>	basic alg				intion of	the main	landuad			DO	4, PO6, I	20_
						natics, as			res of	FU	4, FO6, I	-08
	natural la	0			na pragn	iacies, as		ie resourt				
CO <sub>3</sub>	Analyze				equence	tagging.				PO	2, <b>PO</b> 4, <b>P</b>	O <sub>6</sub> ,
-	5	0 0		0	1	00 0					07, PO	•
CO <sub>4</sub>	Understa	and the o	lesign fe	atures o	f informa	ation retri	eval syst	ems			, <b>PO</b> <sub>3</sub> , <b>P</b>	
							-				<b>PO</b> <sub>12</sub>	
Course	PO <sub>1</sub>	PO <sub>2</sub>	Mappir PO <sub>3</sub>	ng of cou PO4	rse outco PO <sub>5</sub>	omes with	n program <b>PO</b> 7	n outcom PO <sub>8</sub>	es PO <sub>9</sub>	PO <sub>10</sub>	PO <sub>11</sub>	PO
Outcomes										- 010		
CO <sub>1</sub> CO <sub>2</sub>	3	2		2		1		2				
CO <sub>2</sub>		2		3		2	2	2				
CO4	2	2	3	1		2	2	2				2
004	2			l Reasonah	le <sup>.</sup> 2 - Si	-						2
Detailed Contents				cusonub		aniticant'	3 - Strop	na				
	S.					gnificant;	3 - Stro	ng				
Detanca Contents	S:	Introd							antics by	linking t	he "ling	uistics
	s:		uction: I	ntroduct	ion to th	e Morpho	ology, Syr	ntax, Sem				
Unit: 1	S:	view" (	uction: In (comput	ntroduct	ion to th		ology, Syr	ntax, Sem				
	S:	view" ( proces Morph	uction: In (comput sing). ology: A	ntroduct ational li malysis	ion to th inguistic and gen	e Morpho s) with t	ology, Syn he "artifi of langua	ntax, Sem cial intel age on v	vord leve	iew" (nat el: e.g. p	ural lar	nguage s with
Unit: 1	S:	view" ( proces Morph compo	uction: I (comput sing). ology: A unding a	ntroduct ational li analysis and idior	ion to th inguistic and gen natic phi	e Morpho s) with the neration of cases, hor	ology, Syn he "artifi of langua nophono	ntax, Sem cial intel age on v us strings	vord leves as well a	iew" (nat el: e.g. p is loan wo	roblem	nguage s with d their
	s:	view" ( proces Morph compo proces	uction: I: (comput sing). ology: A unding a sing usi:	ntroduct ational l malysis and idior ng e.g. fi	ion to th inguistic and gen natic phi inite stat	e Morpho s) with the neration of cases, hor te autom	blogy, Syn he "artifi of langua nophono ata as we	ntax, Sem cial intel age on v us strings ell as sen	vord leves as well a nantic ne	iew" (nat el: e.g. p as loan wo tworks. A	roblem	nguage s with d their
Unit: 1	S:	view" ( proces Morph compo proces words	uction: In (comput sing). ology: A unding a sing usi like "per	ntroduct ational l analysis and idior ng e.g. f and "pi	ion to th inguistic and gen natic phr inite stat ipe", but	e Morpho s) with the reration of rases, hor te autom will also of	ology, Syn he "artifi of langua nophono ata as wo liscuss so	ntax, Sem cial intel age on v us strings ell as sen ome comj	vord leve s as well a nantic ne plex string	iew" (nat el: e.g. p is loan we tworks. <i>A</i> gs.	roblem ords an Ambigui	nguage s with d their ities in
Unit: 1	S:	view" ( proces Morph compo proces words Syntax	uction: I (comput sing). ology: A unding a sing usi like "per : Analysi	ntroduct ational l analysis and idior ng e.g. f " and "p s and ge	ion to th inguistic and gen natic phr inite stat ipe", but neration	e Morpho s) with the rases, hor te automovil also o of langua	blogy, Syn he "artifi of langua nophono ata as wo discuss so age on ph	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and	vord leve s as well a nantic ne plex string sentence	iew" (nat el: e.g. p as loan we tworks. <i>A</i> gs. e level: e.g	oroblem ords an Ambigui g. applic	nguage s with d their ities in cations
Unit: 1	S:	view" ( process Morph compo process words Syntax such a	uction: I (comput sing). ology: A unding a sing usi like "per : Analysi us mach	ntroduct ational li analysis and idior ng e.g. fi and end and end s and ge ine tran	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a	e Morpho s) with the rases, hor te autom will also o of langua and gram	blogy, Syn he "artifi of langua nophono ata as wo liscuss so ige on ph imar che	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking an	vord leve as well a nantic ne blex string sentence d the pr	iew" (nat el: e.g. p is loan we tworks. <i>A</i> gs. e level: e.g rocessing	oroblem ords an Ambigui g. applic g using	nguage s with d their ties in cations phase
Unit: 1 Unit: 2	S:	view" ( process Morph compo process words Syntax such a structu	uction: I (comput sing). ology: A unding a sing usi like "per like "per : Analysi Is mach ure gram	ntroduct ational l analysis and idior ng e.g. f and "pi s and ge ine tran mars as	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as u	e Morpho s) with the rases, hor te autom will also o of langua and gram	blogy, Syn he "artifi nophono ata as we liscuss se uge on ph umar che n-based f	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking ar formalism	ligence v vord leve s as well a nantic ne <u>blex string</u> sentence id the pi is and rel	iew" (nat el: e.g. p is loan we tworks. A gs. e level: e.g rocessing ating tho	ural lar oroblem ords an Ambigui g. applic g. using se form	s with d their tities in cations phase nalisms
Unit: 1 Unit: 2	<u>S:</u>	view" ( process Morph compo process words Syntax such a structu to recu	uction: Ii (comput sing). ology: A unding a sing usi like "per : Analysi as mach ire gram ursive tra	ntroduct ational l and idior ng e.g. f <u>and "p</u> s and ge ine tran mars as ansition n	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as u	e Morpho s) with the ration of rases, hor te autom will also of of langua and gram inification s (RTNs) a	blogy, Syn he "artifi of langus nophono ata as we <u>liscuss se</u> liscuss se liscuss se discuss se discuss se hophone not se s well as	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking ar formalism augment	ligence v vord leve s as well a nantic ne <u>blex string</u> sentence d the pu as and rel ed transit	iew" (nat el: e.g. p as loan we tworks. <i>A</i> gs. e level: e.g cocessing ating tho ion netw	roblem ords an Ambigui g. applic g. using ose form orks (AT	nguage s with d their ties in cations phase nalisms FNs).
Unit: 1 Unit: 2 Unit: 3	S:	view" ( process Morph compo process words Syntax such a structu to recu Syntax	uction: Ii (comput sing). ology: A unding a sing usi like "per : Analysi as mach ure gram ursive tra : Analysi	ntroduct ational 1 analysis and idior ng e.g. f " and "p s and ge ine tran mars as ansition r s and ge	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as u networks neration	e Morpho s) with t reration of rases, hor te autom will also of of langua and gram unification s (RTNs) a of langua	blogy, Syn he "artifi of langua nophono ata as we discuss se ige on ph imar che n-based is s well as ige on ph	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking ar formalism augment rasal and	vord leve s as well a hantic ne blex string sentence d the pr as and rel ed transit sentence	iew" (nat el: e.g. p as loan we tworks. A gs. e level: e.ş ating tho ion netw e level: e.ş	ural lar roblem ords an Ambigui g. applic g. using se form orks (A2 g. applic	s with d their ties in cations phase palisms [Ns). cations
Unit: 1 Unit: 2	S:	view" ( process Morph compo process words Syntax such a structu to recu Syntax such a	uction: Ii (comput sing). ology: A unding a sing usi like "per : Analysi us mach ure gram ursive tra : Analysi s mach	ntroduct ational l analysis and idior ng e.g. f " and "pi s and ge ine tran mars as ansition r s and ge ine tran	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as u networks neration slation a	e Morpho s) with the ration of rases, hor te autom will also of of langua and gram inification s (RTNs) a	blogy, Syn he "artifi of langua nophono ata as we discuss se ige on ph mar che s well as ige on ph mar che	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking ar formalism augmento rasal and ecking ar	vord leve s as well a hantic ne blex string sentence d the pu s and rel ed transit sentence d the pu	iew" (nat el: e.g. p as loan we tworks. A gs. e level: e.g rocessing ating tho ion netwo e level: e.g rocessing	roblem ords an Ambigui g. applic g. using orks (AT g. applic g. using g. using	nguage s with d their ities in cations phase nalisms <u>rNs).</u> cations phase
Unit: 1 Unit: 2 Unit: 3	S:	view" ( proces Morph compo proces words Syntax such a structu to recu Syntax such a structu	uction: Ii (comput sing). ology: A unding a sing usi like "per : Analysi is mach ure gram : Analysi is mach ure gram	ntroduct ational li and idior ng e.g. fi " and "pi s and ge ine tran mars as ansition n s and ge ine tran mars as	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as u networks neration slation a well as u	e Morphe s) with t eration of cases, hor te autom will also of of langua and gram unification s (RTNs) a of langua and gram	blogy, Syn he "artifi of langua nophono ata as we discuss se ige on ph imar che s well as ige on ph imar che n-based f	ntax, Sem cial intel age on v us strings ell as sen ome comp rasal and ecking an formalism rasal and ecking an formalism	vord leve s as well a nantic ne olex string sentence d the pr is and rel ed transit sentence d the pr is and rel sentence	iew" (nat el: e.g. p as loan we tworks. A gs. e level: e.g ating tho ion netwo e level: e.g cocessing ating tho cocessing	ural lar roblem ords an Ambigui g. applic g. using se form orks (A g. applic g. applic g. using se form	nguage s with d their ties in cations phase nalisms phase phase nalisms
Unit: 1 Unit: 2 Unit: 3 Unit: 4	<u>S:</u>	view" ( process Morph compo process words Syntax such a structu to recu Syntax such a structu to recu Applica	uction: In (comput sing). ology: A unding a sing usi like "per : Analysi us mach ure gram ursive tra ations of	ntroduct ational h analysis and idior ng e.g. f and "pi s and ge ine tran mars as ansition n s and ge ine tran mars as ansition n mars as ansition n	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as un etworks neration slation a well as un chetworks Machine	e Morphe s) with t eration of cases, hor te autom. will also of of langua and gram unification s (RTNs) a of langua and gram unification s (RTNs) a Transla	blogy, Syn he "artifi nophono ata as we discuss se ige on ph imar che s well as ige on ph imar che n-based f s well as	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking ar formalism augment formalism augment	vord leve s as well a nantic ne olex string sentence d the pr s and rel ed transit sentence d the pr s and rel ed transit	iew" (nat el: e.g. p as loan we tworks. A gs. e level: e.g ating tho ion netw. e level: e.g rocessing ating tho ion netw.	roblem ords an Ambigui g. applic g.	nguage s with d their ties in cations phase aalisms phase phase aalisms TNs).
Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5		view" ( process Morph compo process words Syntax such a structu to recu Syntax such a structu to recu Applica Docum	uction: In (comput sing). ology: A unding a sing usi like "per : Analysi as mach ure gram ursive tra ations of nent Gen	ntroduct ational l analysis and idior ng e.g. f " and "p s and ge ine tran mars as ansition n mars as ansition n mars as ansition n mars as ansition n	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as un etworks neration slation a well as un networks Machine NL Inter	e Morphe s) with t eration of cases, hor te autom. will also of of langua and gram unification s (RTNs) a of langua and gram unification s (RTNs) a Transla faces.	ology, Syn he "artifi of langus nophono ata as we liscuss se discuss se liscuss se age on ph nar che s well as ge on ph nar che n-based f s well as tion, Gr	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking ar formalism augment cormalism augment augment	vord leve as well a nantic ne olex string sentence d the pu s and rel ed transit sentence d the pu s and rel ed transit checkers	iew" (nat el: e.g. p us loan we tworks. A gs. e level: e.g cocessing ating tho ion netwo e level: e.g cocessing ating tho ion netwo Dictatio	roblem ords an Ambigui g. applic g. applic g. using g. applic g. applic g. using se form orks (AT orks (AT n, Aut	nguage s with d their ities in cations phase phase phase palisms rNs). omatic
Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and	Evaluati	view" ( process Morph compo process words Syntax such a structu to recu Syntax such a structu to recu Applica Docum	uction: In (comput sing). ology: A unding a sing usi like "per : Analysi as mach ure gram ursive tra as mach ure gram ursive tra ations of ent Gen ern: It in	ntroduct ational l analysis and idior ng e.g. f " and "p s and ge ine tran mars as ansition n s and ge ine tran mars as ansition n " NLP: eration, nclude b	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as u networks Machine NL Inter oth inter	e Morphe s) with t eration of cases, hor te autom will also of of langua and gram inification s (RTNs) a of langua and gram inification s (RTNs) a Transla faces. rnal evalu	blogy, Syn he "artifi of langus nophono ata as we liscuss se liscuss se liscus s	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking ar formalism augment augment formalism augment augment augment augment augment	ligence v vord leve s as well a hantic ne blex string sentence d the pr s and rel ed transit sentence d the pr as and rel ed transit checkers comprisi	iew" (nat el: e.g. p as loan we tworks. A gs. e level: e.ş cocessing ating tho ion netwo e level: e.ş cocessing ating tho ion netwo Dictatio	ural lar roblem ords an Ambigui g. applic g. applic g. using g. applic g. using se form orks (AT orks (AT orks (AT chass set	nguage s with d their ities in cations phase phase phase phase alisms (Ns). omatic ssional
Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 <b>Examination and</b> exams/ assignment	Evaluati	view" ( process Morph compo process words Syntax such a structu to recu Syntax such a structu to recu Applica Docum	uction: In (comput sing). ology: A unding a sing usi like "per : Analysi as mach ure gram ursive tra as mach ure gram ursive tra ations of ent Gen ern: It in	ntroduct ational l analysis and idior ng e.g. f " and "p s and ge ine tran mars as ansition n s and ge ine tran mars as ansition n " NLP: eration, nclude b	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as u networks Machine NL Inter oth inter	e Morphe s) with t eration of cases, hor te autom will also of of langua and gram inification s (RTNs) a of langua and gram inification s (RTNs) a Transla faces. rnal evalu	blogy, Syn he "artifi of langus nophono ata as we liscuss se liscuss se liscus s	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking ar formalism augment augment formalism augment augment augment augment augment	ligence v vord leve s as well a hantic ne blex string sentence d the pr s and rel ed transit sentence d the pr as and rel ed transit checkers comprisi	iew" (nat el: e.g. p as loan we tworks. A gs. e level: e.ş cocessing ating tho ion netwo e level: e.ş cocessing ating tho ion netwo Dictatio	ural lar roblem ords an Ambigui g. applic g. applic g. using g. applic g. using se form orks (AT orks (AT orks (AT chass set	nguage s with d their ities in cations phase phase phase phase alisms (Ns). omatic ssional
Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5	Evaluati	view" ( process Morph compo process words Syntax such a structu to recu Syntax such a structu to recu Applica Docum	uction: In (comput sing). ology: A unding a sing usi like "per : Analysi as mach ure gram ursive tra as mach ure gram ursive tra ations of ent Gen ern: It in	ntroduct ational l analysis and idior ng e.g. f " and "p s and ge ine tran mars as ansition n s and ge ine tran mars as ansition n " NLP: eration, nclude b	ion to th inguistic and gen natic phr inite stat ipe", but neration slation a well as u networks Machine NL Inter oth inter	e Morphe s) with t eration of cases, hor te autom will also of of langua and gram inification s (RTNs) a of langua and gram inification s (RTNs) a Transla faces. rnal evalu	blogy, Syn he "artifi of langus nophono ata as we liscuss se liscuss se liscus s	ntax, Sem cial intel age on v us strings ell as sen ome com rasal and ecking ar formalism augment augment formalism augment augment augment augment augment	ligence v vord leve s as well a hantic ne blex string sentence d the pr s and rel ed transit sentence d the pr as and rel ed transit checkers comprisi	iew" (nat el: e.g. p as loan we tworks. A gs. e level: e.ş cocessing ating tho ion netwo e level: e.ş cocessing ating tho ion netwo Dictatio	ural lar roblem ords an Ambigui g. applic g. applic g. using g. applic g. using se form orks (AT orks (AT orks (AT chass set	nguage s with d their ities in cations phase phase phase phase phase alisms TNs). omatic ssional

1	Daniel Jurafsky, James H. Martin "Speech and Language Processing" Second Edition, Prentice Hall, 2008.
2	Chris Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", MIT Press.
	Cambridge, MA: May 1999.
Refe	rence Books:
1	Allen, James, Natural Language Understanding, Second Edition, Benjamin/Cumming, 1995.
2	Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.

	e				Course T				Lec	ture		
MTCS335PE	Т					and Web	0		L	T P		ester: III
Version: 1.2				of Appro	<b>oval:</b> 16tł	n BoS 17-1	1-2022		4	0 0		
	Scheme of							Scheme				
	Periods		Hrs.							n Score		100
Periods	/ Week	: 4						Inte		aluation		30
	Credits	: 4								emester		70
Instructio			cture						Exam D	uration		3 Hrs.
Prerequisite(s): Di		athema	tics and S	statistics								
Course Objectives		1	1	1 .	1.1	1.0 1						
1. To understand			0				o mining	•				
2. To learn differ												
3. To apply the d												
4. To analyse We		strateg	les and a	igoriunin	s in their	workplac	e or res	earch car	eer.			
Course Outcomes	(00):			0		4						
COs No.				S	tatemen	t					pped Pro	
<u> </u>	Undorste	nd the	nood for	woh min	ing and	Data Mini	nď			01	Itcomes PO <sub>1</sub> , PO	· /
CO <sub>1</sub> CO <sub>2</sub>						Data Mini resource					PO1, PO PO3	2
CO <sub>2</sub> CO <sub>3</sub>						ns in their		ace or red	parch		PO3 PO3, PO	-
$CO_3$	career.		ig strateg	sics and	aigoriull	ns in thei	i workpi		scartin		F <b>U</b> 3, F <b>U</b>	5
CO₄		le searc	h engine	s index a	nd rank	web docu	mente				PO <sub>3</sub> , PO <sub>4</sub> , I	PO
PO <sub>1</sub> - Engineering Kn								tions PO	- Condu			
problems, <b>PO</b> <sub>5</sub> - Mod												
or team work, <b>PO</b> <sub>10</sub> -												
			Mappin	g of coui	se outco	omes with	program	n outcom	es			
<b>Course Outcomes</b>	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	<b>PO</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>
CO <sub>1</sub>	2	2										
CO <sub>2</sub>			2									
CO <sub>3</sub>			2		2							
CO <sub>4</sub>			2	1					1			
			1 – R	easonabl	e: 2 – Sia	mificant.	3 - Strop					
Dotailad Contants					-,	jittj touitt,	5 500	iy				
Detailed Contents	5:	1										
	:				ta Minin	g and Dat	a Mining	g Foundat				
Detailed Contents	:	Web (	WWW), A	A Brief H	ta Minin istory of	g and Dat the Web	a Mining and the	; Foundat Internet,	Web D	ata Mir	ning-Data	a Mining
	:	Web ( Web M	WWW), A Aining. D	A Brief H ata Minii	ta Minin istory of ng Found	g and Dat the Web dations –	a Mining and the Associat	; Foundat Internet, ion Rules	Web D and Se	ata Mir quentia	ning-Data I Pattern	a Mining s – Basio
Unit: 1	:	Web ( Web M Conce	WWW), A Aining. D pts of As	A Brief H ata Minii sociation	ta Minin istory of ng Founc 1 Rules, A	g and Dat the Web dations – priori Alg	a Mining and the Associat orithm-	Foundat Internet, ion Rules Frequent	Web D and Se Itemse	ata Mir quentia t Gener	ning-Data l Pattern ation, As	a Mining s – Basio sociatior
	::	Web ( Web M Conce Rule C	WWW), A Aining. D pts of As Generatio	A Brief H ata Minii sociation n, Data F	ta Minin istory of ng Found Rules, A Formats f	g and Dat the Web dations – priori Alg for Associ	a Mining and the Associat orithm- ation Ru	Foundat Internet, ion Rules Frequent le Mining	Web D and Se Itemse , Mining	Pata Mir quentia t Gener g with n	ning-Data l Pattern ation, As nultiple r	a Mining s – Basic sociatior ninimum
	::	Web ( Web M Conce Rule C suppo	WWW), A Mining. D Ppts of As Generatio rts – Ext	A Brief H ata Minin sociation n, Data F ended M	ta Minin istory of ng Found Rules, A Formats f	g and Dat the Web dations – priori Alg for Associ ining Algo	a Mining and the Associat orithm- ation Ru orithm, R	Foundat Internet, ion Rules Frequent le Mining ule Gene	Web D and Se Itemse , Mining ration,	oata Mir quentia t Gener g with n Mining	ning-Data l Pattern ation, Ass nultiple r Class Ass	a Mining s – Basic sociatior ninimum
	<u></u>	Web ( Web M Conce Rule C suppo Rules,	WWW), A Aining. D pts of As Generatio rts – Ext Basic Co	A Brief H ata Minin sociation n, Data F ended M ncepts o	ta Minin istory of ng Found Rules, A Cormats f Iodel, Mi f Sequen	g and Dat ' the Web dations – Apriori Alg for Associ ining Algo tial Patter	a Mining and the Associat orithm- ation Ru orithm, R 'ns, Mini	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequel	Web D and Se Itemse , Mining ration, ntial Pat	ata Mir quentia t Gener g with n Mining cterns o	hing-Data l Pattern ation, Ass nultiple r Class Ass n GSP,	a Mining s – Basic sociatior ninimum sociatior
		Web ( Web M Conce Rule C suppo Rules, Super	WWW), A Aining. D pts of As Generatio rts – Ext Basic Co vised and	A Brief H ata Minin sociation n, Data F ended M ncepts of 1 Unsupe	ta Minin istory of ng Found Rules, A Tormats f Todel, Mi f Sequen ervised J	g and Dat the Web dations – Apriori Alg for Associ ining Algo tial Patter Learning	a Mining and the Associat orithm- ation Ru orithm, R ms, Minin Supervis	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn	Web D and Se Itemse , Mining ration, 1 ntial Pat ing – E	ata Mir quentia t Gener g with n Mining tterns o Basic Co	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts,	A Mining s – Basic sociatior ninimum sociatior Decisior
		Web ( Web M Conce Rule C suppo Rules, Super Tree	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Inductio	A Brief H ata Minin sociation n, Data F ended M <u>ncepts or</u> 1 Unsupon n – Les	ta Minin istory of ng Found Rules, A Formats f Iodel, Mi f Sequen ervised 1 arning A	g and Dat the Web lations – priori Alg for Associ ining Algo tial Patter Learning Algorithm	a Mining and the Associat orithm- ation Ru orithm, R rns, Minin Supervis , Impur	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func	Web D and Se Itemse , Mining ration, I ntial Pat ing – E tion, H	ata Mir quentia t Gener g with n Mining tterns o Basic Co Iandling	ning-Data l Pattern ation, As nultiple r Class As n GSP, oncepts, g of Co	a Mining s – Basic sociatior ninimum sociatior Decisior ntinuous
Unit: 1		Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Inductio utes, Cla	A Brief H ata Minin sociation n, Data F ended M <u>ncepts o</u> 1 Unsupe n – Les ssifier E	ta Minin istory of ng Found Rules, A Formats f lodel, Mi f Sequen ervised 1 arning A valuation	g and Dat the Web dations – apriori Alg for Associ ining Algo tial Patter Learning S Algorithm n, Rule In	a Mining and the Associat orithm- ation Ru orithm, R 'ns, Minin Supervis , Impur nduction	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque	Web D and Se Itemse , Mining ration, T <u>intial Pat</u> ing – E tion, H ential C	Pata Mir quentia t Gener g with n Mining <u>tterns o</u> Basic Co Iandling Covering	ning-Data l Pattern ation, As nultiple r Class As <u>n GSP,</u> oncepts, g of Co g, Rule I	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning
		Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication I	A Brief H ata Minin sociation n, Data F ended M <u>ncepts or</u> 1 Unsupe n – Lea ssifier E Based on	ta Minin istory of ng Found Rules, A Formats f todel, Mi f Sequen ervised 1 arning 4 valuation Associa	g and Dat the Web dations – apriori Alg for Associ ining Algo <u>tial Patter</u> Learning Algorithm n, Rule In ations, Na	a Mining and the Associat orithm- ation Ru orithm, R ms, Minin Supervis , Impur nduction üve Baye	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas	Web D and Se Itemse , Mining ration, 1 ntial Pat ing – E tion, H ential C ssificatio	ata Mir quentia t Gener g with n Mining <u>tterns o</u> Basic Co Iandling Covering on, Naï	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning ian Tex
Unit: 1		Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi	WWW), A Aining. D pts of As Generatio rts – Ext Basic Co vised and Induction utes, Cla fication – fication –	A Brief H ata Minin sociation n, Data F ended M ncepts of l Unsupe n – Lea ssifier E Based on - Probabi	ta Minin istory of ng Found Rules, A formats f todel, Mi f Sequen ervised 1 arning A valuation Associa ilistic Fra	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning Algorithm n, Rule In ations, Na amework,	a Mining and the Associat orithm- ation Ru orithm, R ms, Minin Supervis , Impur nduction üve Baye Naïve B	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas ayesian N	Web D and Se Itemse , Mining ration, A ntial Pat ing – E tion, H ential C ssification Model, U	pata Mir quentia t Gener g with n Mining <u>cterns o</u> Basic Cc Iandling Covering on, Naï Unsuper	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes rvised Le	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning ian Tex arning
Unit: 1		Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Basic	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication – Concept:	A Brief H ata Minin sociation n, Data F ended M <u>ncepts or</u> 1 Unsupe n – Lea ssifier E Based on Probabi s, K-mea	ta Minin istory of ng Found Rules, A Cormats f todel, Mi f Sequen ervised 1 arning A valuation Associa ilistic Fra ans Clus	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning Algorithm n, Rule In ations, Na amework, tering –	a Mining and the Associat orithm- ation Ru orithm, R ns, Minin Supervis , Impur nduction ive Baye Naïve B K-means	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas ayesian N	Web D and Se Itemse , Mining ration, A ntial Pat ing – E tion, H ential C ssification Model, U	pata Mir quentia t Gener g with n Mining <u>cterns o</u> Basic Cc Iandling Covering on, Naï Unsuper	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes rvised Le	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning ian Tex sarning -
Unit: 1		Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Basic Hieran	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Inductio utes, Cla fication F fication – Concept: chical Cl	A Brief H ata Minin sociation n, Data F ended M <u>ncepts or</u> 1 Unsupe n – Lea ssifier E Based on Probabi s, K-mea ustering,	ta Minin istory of ng Found Rules, A Formats f todel, Mi f Sequen ervised I arning A valuation Associa ilistic Fra ans Clus Strengtl	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning A Algorithm n, Rule In ations, Na amework, tering – h and Wea	a Mining and the Associat orithm- ation Ru orithm, R ns, Minin Supervis , Impur nduction ive Baye Naïve B K-means akness.	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas ayesian M s Algorith	Web D and Se Itemse , Mining ration, I ntial Pat ing – E tion, H ential C ssification Model. U Im, Rep	pata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co Iandling Covering on, Naë Unsuper presenta	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes rvised Le tion of	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning ian Tex arning – Clusters
Unit: 1	<u>.</u>	Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Basic Hierar Inform	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication – Concept: <u>cchical Cl</u> nation Re	A Brief H ata Minin sociation n, Data F ended M <u>ncepts or</u> d Unsupe n – Lea ssifier E Based on - Probabi s, K-mea <u>ustering</u> , trieval ar	ta Minin istory of ng Found Rules, A Formats f lodel, Mi f Sequen ervised I arning A valuation Associa ilistic Fra ans Clus Strengtl nd Web S	g and Dat the Web dations – apriori Alg for Associ ining Algo tial Patter Learning A Algorithm n, Rule In ations, Na amework, tering – h and Wea Search: Ba	a Mining and the Associat orithm- ation Ru orithm, R ns, Minin Supervis , Impur nduction üve Baye Naïve B K-means akness. sic Conc	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas ayesian M s Algorith epts of In	Web D and Se Itemse , Mining ration, , <u>ntial Pat</u> ing – E tion, H ential C ssification Model. U am, Rep	pata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co Iandling Covering on, Naï Unsuper presenta	ning-Data l Pattern ation, Ass nultiple r Class Ass <u>n GSP,</u> oncepts, g of Co g, Rule I ve Bayes vised Le ation of	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning arning – Clusters
Unit: 1 Unit: 2	<u></u>	Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Basic Hierar Inforn Retrie	WWW), A Aining. D Apts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication – Concepta chical Cl nation Re val Metho	A Brief H ata Minin sociation n, Data F ended M <u>ncepts o</u> d Unsupe n – Lea ssifier E Based on Probabi s, K-mea <u>ustering,</u> trieval ar ods – Bo	ta Minin istory of ng Found Rules, A Formats f lodel, Mi Sormats f lodel, Mi f Sequen ervised I arning A valuation Associa ilistic Fra ans Clus <u>Strengtl</u> d Web S polean M	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning A Algorithm n, Rule In ations, Na amework, tering – h and Wea	a Mining and the Associat orithm- ation Ru orithm, R 'ns, Minin Supervis , Impur nduction üve Baye Naïve B K-means akness. sic Conc tor Spac	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas ayesian N s Algorith epts of In e Model	Web D and Se Itemse , Mining ration, A ntial Pat ing – E tion, H ential C ssification Model. U am, Rep formati and Sta	pata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co Basic Co Iandling Covering on, Naï Unsuper presenta on Retr atistical	ning-Data l Pattern ation, Asa nultiple r Class Asa <u>n GSP,</u> oncepts, g of Co g, Rule I ve Bayes rvised Leation of ieval, Infe Languag	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning ian Tex clusters ormation e Model
Unit: 1	<u></u>	Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Basic Hierar Inform Retrie Releva	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication – Concept: chical Cl nation Re val Methonce Feed	A Brief H ata Minin sociation n, Data F ended M <u>ncepts o</u> 1 Unsupe n – Lea ssifier E Based on Probabi s, K-mea ustering, trieval ar ods – Bo lback, Ev	ta Minin istory of ng Found Rules, A Formats f todel, Mi f Sequen ervised 1 arning A valuation Associa ilistic Fra ans Clus <u>Strengtl</u> nd Web S polean M valuation	g and Dat the Web dations – apriori Alg for Associ ining Algo tial Patter Learning F Algorithm n, Rule In ations, Na amework, tering – h and Wea Search: Ba todel, Vec	a Mining and the Associat orithm- ation Ru orithm, R 'ns, Minin Supervis , Impur nduction ive Baye Naïve B K-means akness. sic Conc tor Spac s, Text a	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque estian Clas ayesian N s Algorith epts of In e Model nd Web	Web D and Se Itemse , Mining ration, I ntial Pat ing – E tion, H ential C ssification Model, U m, Rep formati and Sta Page Pr	pata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co Basic Co Iandling Covering on, Nar Unsuper presenta on Retr atistical reproces	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes rvised Le ation of ieval, Infe Languag ssing - S	a Mining s – Basia sociation ninimum sociation Decision ntinuous Learning ian Tex arning – Clusters ormation e Model Stopword
Unit: 1 Unit: 2		Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Basic Hieran Inform Retrie Releva Remov	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication – Concept: <u>chical Cl</u> nation Re val Methon nce Feed val, Stem	A Brief H ata Minin sociation n, Data F ended M <u>ncepts o</u> d Unsupe n – Lea ssifier E Based on Probabi s, K-mea ustering, trieval ar ods – Bo lback, Ev ming, Wo	ta Minin istory of ng Found Rules, A formats f todel, Mi f Sequen ervised 1 arning A valuation Associa ilistic Fra ans Clus <u>Strengtl</u> nd Web S polean M valuation eb Page	g and Dat the Web dations – apriori Alg for Associ ining Algo tial Patter Learning A lgorithm h, Rule In ations, Na amework, tering – h and Wea Search: Ba codel, Vec Measure	a Mining and the Associat orithm- ation Ru orithm, R ns, Minin Supervis , Impur nduction ive Baye Naïve B K-means akness. sic Conc tor Spac s, Text a ssing, Du	g Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque estan Clas ayesian N s Algorith epts of In e Model nd Web uplicate D	Web D and Se Itemse , Mining ration, I ntial Pat ing – E tion, H ential C ssification Model. U am, Rep formati and Sta Page Pr etection	pata Mir quentia t Gener g with n Mining cterns o basic Co landling Covering on, Naë Unsuper presenta	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes vised Le ation of ieval, Info Languag ssing – S ted Inde	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning – Clusters ormation e Model Stopword x and Its
Unit: 1 Unit: 2		Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Classi Basic Hieran Inform Retrie Releva Remov Comp	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication – Concepta chical Cl nation Re val Methon nce Feec val, Stem ression –	A Brief H ata Minin sociation n, Data F ended M <u>ncepts or</u> 1 Unsupe n – Lea ssifier E Based on Probabi s, K-mea <u>ustering,</u> trieval ar ods – Bo lback, Ew ming, We	ta Minin istory of ng Found Rules, A formats f todel, Mi f Sequen ervised 1 arning A valuation Associa ilistic Fra ans Clus Strengtl d Web S oolean M valuation eb Page d Index,	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning H Algorithm n, Rule In ations, Na amework, tering – h and Wea Search: Ba iodel, Vec Measure Preproces	a Mining and the Associat orithm- ation Ru orithm, R ms, Minin Supervis , Impur nduction üve Baye Naïve B K-means akness. sic Conc tor Spac s, Text a ssing, Du using In	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque estian Clas ayesian N s Algorith epts of In e Model ind Web iplicate D verted In	Web D and Se Itemse , Mining ration, A ntial Pat ing – E tion, H ential C ssification Model. U and, Rep formati and Sta Page Pr etection dex, In	ata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Cc landling Covering on, Naï Unsuper presenta on Retr tistical reproces n, Inver dex Co	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes rvised Le ation of ieval, Infe Languag ssing – S ted Inde nstructio	a Mining s – Basia sociation ninimum sociation Decision ntinuous Learning ian Tex arning – Clusters ormation e Model Stopword x and Its
Unit: 1 Unit: 2		Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Basic Hieran Inform Retrie Releva Remov Comp Comp	WWW), A Anining. D pts of As Generatio rts – Ext Basic Co vised and Inductio utes, Cla fication F fication - Concepts chical Cl nation Re val Methonce Feed val, Stem ression - ression, L	A Brief H ata Minin sociation n, Data F ended M <u>ncepts or</u> 1 Unsupe n – Lea ssifier E Based on Probabi s, K-mea ustering, trieval ar ods – Bo lback, Ev ming, We Inverte <u>atent Se</u>	ta Minin istory of ng Found Rules, A Formats f todel, Mi f Sequen ervised I arning A valuation Associa ilistic Fra ans Clus Strengtl nd Web S polean M valuation eb Page d Index, mantic In	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning H Algorithm n, Rule In ations, Na amework, tering – h and Wea Search: Ba odel, Vec Measure Preproces , Search	a Mining and the Associat orithm- ation Ru orithm, R ns, Minin Supervis , Impur nduction üve Baye Naïve B K-means akness. sic Conc tor Spac s, Text a ssing, Du using In Singular	g Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque estan Clas ayesian N s Algorith epts of In e Model nd Web uplicate D verted In Value De	Web D and Se Itemse , Mining ration, M ing – E tion, H ential C ssification Model. U and, Rep formati and Sta Page Pr etection dex, In compos	ata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co Iandling Covering on, Naï Unsuper oresenta on Retr atistical reproces n, Inver dex Co ition, Q	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes rvised Le ation of ieval, Infe Languag ssing – S ted Inde nstructio uery	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning clasters ormation e Model Stopword x and Its on, Indez
Unit: 1 Unit: 2	<u>.</u>	Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Basic Hierar Inform Retrie Releva Remov Comp Comp	WWW), A Anining. D opts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication F fication F fication F concept: <u>chical Cl</u> nation Re val Methonce Feed val, Stem ression – <u>ression, L</u> nalysis a	A Brief H ata Minin sociation n, Data F ended M <u>ncepts or</u> d Unsupe n – Lea ssifier E Based on Probabi s, K-mea ustering, trieval ar ods – Bo lback, Ev ming, We atent Ser nd Web	ta Minin istory of ng Found Rules, A formats f todel, Mi f Sequen ervised I arning A valuation Associa ilistic Fra ans Clus Strengtl nd Web S polean M valuation eb Page d Index, <u>mantic In</u> Crawling	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning A Algorithm h, Rule In tions, Na amework, tering – h and Wea Search: Ba Godel, Vec Measure Preproces , Search ndexing – g: Link An	a Mining and the Associat orithm- ation Ru orithm, R ns, Minin Supervis , Impur nduction üve Baye Naïve B K-means akness. sic Conc tor Spac s, Text a ssing, Du using In Singular alysis –	Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas ayesian N s Algorith epts of In e Model nd Web uplicate D verted In <u>Value De</u> Social Ne	Web D and Se Itemse , Mining ration, Mining - E tion, H ential C ssification Model. U and Rep formati and Sta Page Pr etection dex, In compos twork A	ata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co Iandling Covering on, Naë Unsuper presenta on Retr atistical reproces n, Inver dex Co <u>ition, Q</u> Analysis	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes rvised Le ation of ieval, Infe Languag ssing - S ted Inde nstructio uery , Co-Cita	A Mining s – Basic sociation ninimum sociation Decision ntinuous Learning clarning – Clusters ormation te Model Stopword x and Its on, Indes
Unit: 1 Unit: 2 Unit: 3	<u>.</u>	Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Basic Hierar Inforn Retrie Releva Remov Comp Comp Link A Bibliog	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication I fication F fication F concept: <u>chical Cl</u> nation Re val Metho nce Feec val, Stemi ression – ression, L nalysis a graphic (	A Brief H ata Minin sociation n, Data F ended M <u>ncepts or</u> d Unsupe n – Lea ssifier E Based on · Probabi s, K-mea <u>ustering</u> , trieval ar ods – Bo lback, Ev ming, We · Inverte <u>atent Ser</u> nd Web Coupling	ta Minin istory of ng Found Rules, A formats f todel, Mi f Sequen ervised I arning A valuation Associa ilistic Fra ans Clus Strengtl nd Web S polean M valuation eb Page d Index, mantic In Crawling , Page F	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning A Algorithm n, Rule In ations, Na amework, tering – h and Wea Search: Ba codel, Vec Measure: Preproces , Search dexing – g: Link An Rank Algo	a Mining and the Associat orithm- ation Ru orithm, R ms, Minin Supervis , Impur nduction ive Baye Naïve B K-means akness. sic Conc tor Spac s, Text a ssing, Du using In <u>Singular</u> alysis – Sorithm, I	g Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas ayesian M s Algorith epts of In e Model nd Web uplicate D verted In Value De Social Ne HITS Algo	Web D and Se Itemse , Mining ration, <u>inial Pat</u> ing – E tion, H ential C ssification Model. U am, Rep formati and Sta Page Pr etection dex, In compos twork A prithm,	ata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co landling Covering on, Naï Unsuper presenta on Retr atistical reproces n, Inver dex Co <u>ition, Q</u> Analysis Comm	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes vised Le ation of ieval, Infe Languag ssing – S ted Indes nstructio uery , Co-Cita unity Di	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning – Clusters ormation a Model Stopword x and Its on, Indes
Unit: 1 Unit: 2	<u>.</u>	Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Basic Hierar Inforn Retrie Releva Remov Comp Comp Link A Bibliog Proble	WWW), A Aining. D pts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication – Concept: chical Cl nation Re val Methon nce Feec val, Stem- ression, L nalysis a graphic (cen Defin	A Brief H ata Minin sociation n, Data F ended M <u>ncepts of</u> d Unsupe n – Lea ssifier E Based on Probabi s, K-mea <u>ustering</u> , trieval ar ods – Bo lback, Ev ming, We atent Ser nd Web Coupling ition, Bi	ta Minin istory of ng Found Rules, A Formats f todel, Mi f Sequen ervised I arning A valuation Associa ilistic Fra ans Clus Strengtl nd Web S bolean M valuation eb Page d Index, mantic In Crawling , Page I partite	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning A Algorithm h, Rule In ations, Na amework, tering – h and Wea Gearch: Ba todel, Vec Measure Preproces , Search dexing – g Link An Rank Algo Core Con	a Mining and the Associat orithm- ation Ru orithm, R ns, Minin Supervis , Impur nduction ive Baye Naïve B K-means akness. sic Conc tor Spac s, Text a ssing, Du using In <u>Singular</u> alysis – prithm, I nmunitie	g Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas ayesian N s Algorith epts of In e Model nd Web uplicate D verted In <u>Value De</u> Social Ne HITS Alges, Maxin	Web D and Se Itemse , Mining ration, 1 ing – E tion, H ential C ssification Model. U m, Rep formati and Sta Page Pr etection dex, In compos twork A prithm, num Flo	ata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co Iandling Covering on, Naï Unsuper presenta on Retr atistical reproces n, Inver dex Co ition, Q Analysis Comm ow Cor	ning-Data l Pattern ation, Ass nultiple r Class Ass <u>n GSP,</u> oncepts, g of Co g, Rule I ve Bayes vised Lea tion of ieval, Infe Languag ssing – S ted Inde: nstruction uery , Co-Cita unity Di nmunitie	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning ian Text arning – Clusters ormation e Model Stopword x and Its on, Index ntion and scovery- s, Email
Unit: 1 Unit: 2 Unit: 3	<u>.</u>	Web ( Web M Conce Rule C suppo Rules, Super Tree Attrib Classi Classi Basic Hierar Inforn Retrie Releva Remov Comp Comp Link A Bibliog Proble Comm	WWW), A Aining. D Apts of As Generatio rts – Ext <u>Basic Co</u> vised and Induction utes, Cla fication – Concepta fication Re val Methonice Feed val, Stem ression – ression, L malysis a graphic Cem Definion unities.	A Brief H ata Minin sociation n, Data F ended M <u>ncepts o</u> d Unsupe n – Lea ssifier E Based on Probabi s, K-mea <u>ustering,</u> trieval ar ods – Bo lback, Ev ming, We - Inverte <u>atent Sep</u> nd Web Coupling ition, Bi Web Cr	ta Minin istory of ng Found Rules, A Formats f lodel, Mi f Sequen ervised I arning A valuation Associa ilistic Fra ans Clus <u>Strengtl</u> nd Web S bolean M valuation eb Page d Index, mantic In Crawling partite f awling	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning A digorithm h, Rule In Algorithm h, Rule In ations, Na amework, tering – h and Wea Gearch: Ba odel, Vec Measure Preproces , Search ndexing – g: Link An Rank Algo Core Con – A Basi	a Mining and the Associat orithm- ation Ru orithm, R ns, Minin Supervis , Impur nduction ive Baye Naïve B K-means akness. sic Conc tor Spac s, Text a ssing, Du using In Singular alysis – prithm, H	g Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque esian Clas ayesian N s Algorith epts of In e Model nd Web uplicate D verted In Value De Social Ne HITS Algorish es, Maxin ler Algori	Web D and Se Itemse , Mininą ration, in <u>ntial Pat</u> ing – E tion, H ential C ssificatio Model. U ssificatio Model. U m, Rep formati and Sta Page Pri etection dex, In compos twork A prithm, num Fle ithm-	ata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co Basic Co Iandling Covering on, Naï Jnsuper oresenta on Retr atistical reproces n, Inver dex Co dition, Q Analysis Comm ow Cor Breadth	ning-Data l Pattern ation, Asa nultiple r Class Asa <u>n GSP,</u> oncepts, g of Co g, Rule I ve Bayes rvised Lea tion of ieval, Infe Languag ssing – S ted Inde nstructio uery , Co-Cita unity Di nmunitie First (	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning – Clusters ormation e Model Stopword x and Its on, Index scovery- es, Emai Crawlers
Unit: 1 Unit: 2 Unit: 3	<u>.</u>	Web ( Web M Conce Rule C Suppo Rules, Super Tree Attrib Classi Basic Hieran Inforn Retrie Releva Remov Comp Link A Bibliog Proble Comm Prefer	WWW), A Aining. D Aining. D Ppts of As Generatio rts – Ext Basic Co vised and Induction utes, Cla fication F fication - Concepta chical Cl hation Re val Methance Feed val, Stem ression - ression, L nalysis a graphic C em Defin nunities. ential Cr	A Brief H ata Minin sociation n, Data F ended M <u>ncepts o</u> d Unsupe n – Lea ssifier E Based on Probabi s, K-mea <u>ustering</u> , trieval ar ods – Bo lback, Ev ming, We Iback, Ev ming, We Coupling ition, Bi Web Cr awlers, I	ta Minin istory of ng Found Rules, A Formats f lodel, Mi f Sequen ervised I arning A valuation Associa ilistic Fra ans Clus Strengtl nd Web S bolean M valuation eb Page d Index, mantic In Crawling partite o rawling mplemen	g and Dat the Web dations – spriori Alg for Associ ining Algo tial Patter Learning A Algorithm h, Rule In ations, Na amework, tering – h and Wea Gearch: Ba todel, Vec Measure Preproces , Search dexing – g Link An Rank Algo Core Con	a Mining and the Associat orithm- ation Ru orithm, R ns, Minin Supervis , Impur nduction üve Baye Naïve B K-means akness. sic Conc tor Spac s, Text a ssing, Du using In Singular alysis – for ic Craw sues – Fe	g Foundat Internet, ion Rules Frequent le Mining ule Gene ng Sequen ed Learn ity Func – Seque estan Clas ayesian M s Algorith epts of In e Model nd Web uplicate D verted In Value De Social Ne HITS Algor ets, Maxin ler Algor	Web D and Se Itemse , Mining ration, T ing – E tion, H ential C ssification Model. U ssification Model. U formati and Sta Page Pr etection dex, In compose twork A prithm, num Fle ithm- Parsing,	ata Mir quentia t Gener g with n Mining <u>terns o</u> Basic Co Basic Co Iandling Covering on, Naï Unsuper oresenta on Retr tistical reproces n, Inver dex Co <u>ition, Q</u> Analysis Comm ow Cor Breadth Stopwo	ning-Data l Pattern ation, Ass nultiple r Class Ass n GSP, oncepts, g of Co g, Rule I ve Bayes rvised Le ation of ieval, Infe Languag ssing – S ted Inde nstructio uery , Co-Cita unity Di nmunitie h First Co ord Remo	a Mining s – Basic sociation ninimum sociation Decision ntinuous Learning – Clusters ormation e Model Stopword x and Its on, Index scovery- es, Emai Crawlers

	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
Exar	mination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class sessional
exar	ns/assignments/quiz/seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
exar	nination.
Text	t Books:
1	Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data by Bing Liu (Springer Publications)
2	Mining the Web: Discovering Knowledge from Hypertext Data by Soumen Chakrabarti
Refe	erence Books:
1	Data Mining: Concepts and Techniques, Second Edition Jiawei Han, Micheline Kamber (Elsevier Publications)

2 Web Mining: Applications and Techniques by Anthony Scime

Course Coo					Course T				Leo	ture		
MTCS341P	ET					chnology			L	T P		ester: III
Version: 1.2	~ 1			of Appr	<b>oval:</b> 16tl	h BoS 17-1	1-2022	~ 1	4	0 0		
	Scheme							Scheme				100
	f Periods s/Week	1 1	Hrs.							n Score		100
Periods	Credits	: 4						Inte		aluation emester		30 70
Instructio			ture							uration		3 Hrs.
Prerequisite(s): N										uiation	·	51115.
Course Objective		becuite	<b>y</b>									
1. To understan		ction of	Blockcha	ain as a r	nethod c	of securing	g distrib	uted ledge	ers.			
2. To familiarize												
3. To familiarize	e about wa	allets an	d learn t	heir utili	zation of	f wallet dı	iring trai	nsaction.				
4. To understan		w to wri	te and aj	oply the	Smart Co	ontracts.						
<b>Course Outcome</b>	s (CO):											
COs No.				S	Statemer	nt					pped Pr	
			-								tcomes	· /
CO <sub>1</sub>	Apply the					. 6				P	O1, PO2,	
	Apply the				-	atform.					$PO_4, P$	
CO <sub>3</sub> CO <sub>4</sub>	Apply the					dtochnic	al gapa a	xisting be	twoon		PO <sub>4</sub> , P PO <sub>1</sub> , P	
$CO_4$	theory a	5			0		ai gaps e	ansung be	tween		$\mathbf{PO}_1, \mathbf{PO}_2$	03
<b>PO</b> 1- Engineering K						/developm	ent of sol	utions. PO4	- Condu	t t invest	igations	of complex
problems, PO5- Mo	dern tool ı	usage, <b>PO</b>	6- The er	igineer ar	nd society	, <b>PO</b> 7- Env	ironment	and sustain	nability, 1			
or team work, PO10	- Commun	ication, <b>P</b>										
		1	Маррії	ng of cou	irse outc	omes wit	h progra	m outcom	nes	r	- <u>r</u>	
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	<b>PO</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>
Outcomes CO <sub>1</sub>	3	2	2									
CO <sub>1</sub>	3	2	2	2	2							
<u> </u>				2	2	2						
CO4	3		2			-						
	Ū.		1 - 1	Reasonal	ole; 2 – Si	ignificant	; 3 – Stro	ong		1		
<b>Detailed</b> Content	ts:						·	Ū				
								graph, rin				
Unit: 1								d Euler's t				
		U			•	0	0	thm, ElGa			n, Ellip	tic curve
								nowledge			1 1 . 1	'
								rency, fur e Block, l				
Unit: 2					-			e Tree, Lif				0
51						nding mor		, 21			, <b>L</b>	
					-	0		eed of Blo	<u>ckch</u> ain	<u>, Ben</u> efit	ts of Blo	<u>ckcha</u> in.
								the Bloc				
								, how mir				
Unit: 3							-	nms: Proo	f of Wo	ork (PoV	V), Asyn	chronous
						Stake (PoS	5),					
					PoS), DPo		wore Do	per, Web,	Deskto	n Ether		Ethoroun
								Vallets fo				
								smart				
Unit: 4								ctional Fe				
								. Impleme				
		on Eth	ereum.			-						
								ledger, V				
								e, Membe				
Unit: 5								rledger, Fa				
								Ledger, N				
					icate Au	unority, T	ransactio	on Flow. I	inpieme	int the u	ise case	or supply
		chain (	on Hyper	ieuger.								

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	Mastering Blockchain, Imran Bashir, Packt Publishing
2	Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten,Andrew
	Miller, Steven Goldfeder, Princeton University Press. https://bitcoinbook.cs.princeton.edu/
Refe	rence Books:
1	Grokking Bitcoin, Kalle Rosenbaum, Manning Publications. <u>http://rosenbaum.se/book/grokking-bitcoin.html</u>
2	Blockchain Basics, Daniel Drescher, Apress
	Publication <u>http://vlabs.iitb.ac.in/vlabs-</u> dev/labs/blockchain/labs/index.php

Course					Course 7				1	ture		_	
MTCS34	2PET		-		/	nformatic			L		P	Sem	ester: IV
Version: 1.2	. 1			e of App	roval: 161	th BoS 17-		~ 1	4	v	0		
		e of Inst						Scheme o					0.0
	of Periods		Hrs.						/laximu				00
Perio	ods/Week	: 4						Inte	ernal Eva				30
T	Credits	: 4	- 4						End S				70
	tion Mode		cture	Decie Di	1				Exam E	vuratio	n	: .	8 Hrs.
Prerequisite(		Intellig	ence and	Basic Big	biogy								
Course Objec			the free d			f D: - : - f		م با ۸ معنات م	tal Inta	11:			
	arize stude re knowled												
1	t how to ap												
-	-	- •				-				clateu		DIOIIII	J matics
	arize stude	nts with	the conc	epts of n	iture tec	inniques i	n Genetic	applicatio	ons.				
Course Outco COs No.	$\frac{1}{1}$				Statem	~~+					Mar	an ad T	
COS NO.					Statem	ent							rogram s (POs)
CO <sub>1</sub>	Pecogni	zo tho	nurnos	e of m	مامدينام	· biolog	and cl	nallender	in th			<b>PO</b> <sub>1</sub> , 1	
	Bioinfor		purpos		loicculai	biology		lanenges	111 U			<b>FO</b> 1, 1	U2
CO <sub>2</sub>			rent tech	niques o	of classif	ication an	d clusteri	ng with r	espect	0		<b>PO</b> <sub>2</sub> , 2	PO3
			pplication		1 Classil			ing with I	especi			<b>- O</b> <sub>2</sub> ,	•••
CO <sub>3</sub>					to neur	al networ	k and gene	etic algori	thms			<b>PO</b> <sub>4</sub> ,	PO5
CO <sub>4</sub>							ellular Aut	-		id			9, PO <sub>10</sub>
004	method		incepts 0	Geneti	c i i ogia	iiiiiiig, c			lu Hybi		10	4,10	9, 1 010
PO1- Engineeri			roblem ar	nalvsis. <b>PC</b>	) <sub>3</sub> - Design	n/developr	nent of solu	tions. PO4	- Condu	ct inves	stiga	ations o	of comple
problems, PO5-													
or team work, I	Comm	unication	DO. Dro	iect mana	gement a	nd finance	PO12- Life-	long Learr	ning				
	PO <sub>10</sub> - Comm	unication	$\mathbf{ro}_{11}$ rio	jeet mana	<u>gement u</u>	nu manee							
	PO <sub>10</sub> - Collin	unication					ith program						
Course			Марр	oing of co	ourse out	tcomes wi	ith prograi	n outcom	nes	PO,	0	PO,,,	PO
	PO <sub>1</sub>	PO <sub>2</sub>								PO <sub>10</sub>	0	<b>PO</b> <sub>11</sub>	PO
Course Outcomes CO <sub>1</sub>		<b>PO</b> <sub>2</sub>	Марр <b>РО</b> 3	oing of co	ourse out	tcomes wi	ith prograi	n outcom	nes	PO	0	PO <sub>11</sub>	PO
Course Outcomes CO <sub>1</sub> CO <sub>2</sub>	PO <sub>1</sub>	PO <sub>2</sub>	Марр	PO4	PO₅	tcomes wi	ith prograi	n outcom	nes	PO <sub>10</sub>	0	PO <sub>11</sub>	PO
Course           Outcomes           CO1           CO2           CO3	PO <sub>1</sub>	<b>PO</b> <sub>2</sub>	Марр <b>РО</b> 3	PO <sub>4</sub>	ourse out	tcomes wi	ith prograi	n outcom	PO9		0	PO <sub>11</sub>	PO <sub>12</sub>
Course Outcomes CO <sub>1</sub> CO <sub>2</sub>	PO <sub>1</sub>	<b>PO</b> <sub>2</sub>	Mapp PO3 2	PO4 PO4 2 2	PO5 PO5	PO <sub>6</sub>	PO7	PO <sub>8</sub>	nes	<b>PO</b> 10	0	PO <sub>11</sub>	PO <sub>12</sub>
$\begin{array}{c} Course\\ \hline Outcomes\\ \hline CO_1\\ \hline CO_2\\ \hline CO_3\\ \hline CO_4\\ \end{array}$	<b>PO</b> <sub>1</sub> 3	<b>PO</b> <sub>2</sub>	Mapp PO3 2	PO4 PO4 2 2	PO5 PO5	PO <sub>6</sub>	ith prograi	PO <sub>8</sub>	PO9		0	PO <sub>11</sub>	PO <sub>12</sub>
Course           Outcomes           CO1           CO2           CO3	<b>PO</b> <sub>1</sub> 3	PO <sub>2</sub> 2 2	Mapp PO <sub>3</sub> 2 1-	PO4 PO4 2 2 - Reasona	<b>PO</b> 5 2 <b>able; 2 -</b> 2	PO <sub>6</sub> PO <sub>6</sub> Significan	PO7 PO7 ht; 3 – Stro	m outcom POs ng	PO9 2	3			
$\begin{array}{c} Course\\ \hline Outcomes\\ \hline CO_1\\ \hline CO_2\\ \hline CO_3\\ \hline CO_4\\ \end{array}$	<b>PO</b> <sub>1</sub> 3	PO2 2 2 	Mapp PO <sub>3</sub> 2 1- 1uction: 1	PO4 PO4 2 2 • Reasona	PO5 PO5 2 able; 2 - 5	PO <sub>6</sub> PO <sub>6</sub> Significan	PO7 PO7 ut; 3 – Stro s of Molec	n outcom PO <sub>8</sub> ng ular Biolo	PO9 PO9 2 ogy: Ba	3 sic cell	l ar	chitec	ture, Th
$\begin{array}{c} Course\\ \hline Outcomes\\ \hline CO_1\\ \hline CO_2\\ \hline CO_3\\ \hline CO_4\\ \end{array}$	<b>PO</b> <sub>1</sub> 3	PO <sub>2</sub> 2 2 Introd struct	Mapp PO <sub>3</sub> 2 1- luction: 1 ure, cont	PO4 PO4 2 2 - Reasona Introduc	PO5 PO5 2 ible; 2 - 5 tion to t scale of	PO <sub>6</sub> Significan Che Basics deoxyribo	PO7 PO7 ut; 3 – Stro s of Molec onucleic ad	n outcom PO <sub>8</sub> ng ular Biol cid (DNA)	PO9 2 ogy: Ba	3 sic cell	l ar	chitec	ture, Th
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	PO <sub>1</sub> 3 tents:	PO2 2 2 Introd struct Genes	Mapp PO <sub>3</sub> 2 1 - luction: I ure, cont and pr	PO4 PO4 2 2 • Reasona Introduc cent and roteins,	PO5 PO5 2 ible; 2 - 1 tion to 1 scale of Current	PO6 PO6 Significan Che Basics deoxyribo knowled	PO7 PO7 t; 3 – Stro s of Molec onucleic ad ge and t	n outcom PO <sub>8</sub> ng rular Biol- cid (DNA) he 'cent:	PO9 2 ogy: Ba , Histor ral dog	3 sic cell y of th ma', N	l are ne h Why	chitec numan y prot	ture, Th genome eins ar
$\begin{array}{c} Course\\ \hline Outcomes\\ \hline CO_1\\ \hline CO_2\\ \hline CO_3\\ \hline CO_4\\ \end{array}$	PO <sub>1</sub> 3 tents:	PO2 2 2 Introd struct Genes impor	Mapp PO <sub>3</sub> 2 1- luction: I ure, cont and pr tant, Ge	PO4 PO4 2 2 Reasona Introduc cent and roteins, ene and	PO5 PO5 2 ible; 2 - 1 tion to 1 scale of Current	PO6 PO6 Significan Che Basics deoxyribo knowled	PO7 PO7 ut; 3 – Stro s of Molec onucleic ad	n outcom PO <sub>8</sub> ng rular Biol- cid (DNA) he 'cent:	PO9 2 ogy: Ba , Histor ral dog	3 sic cell y of th ma', N	l are ne h Why	chitec numan y prot	ture, Th genome eins ar
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	PO <sub>1</sub> 3 tents:	PO2 2 2 Introd struct Genes impor bioinf	Mapp PO <sub>3</sub> 2 1- luction: I ure, cont and pr tant, Ge prmatics	PO4 PO4 2 2 Reasona Introduc cont and coteins, ene and	PO5 PO5 2 uble; 2 - 3 tion to t scale of Current cell r	PO6 Significan Che Basics deoxyribo knowled egulation	PO7 PO7 at; 3 – Stro s of Molec onucleic ad lge and t , When	n outcom POs ng cular Biolo cid (DNA) he 'centi cell regu	PO9 PO9 2 ogy: Ba , Histor ral dog ulation	3 sic cell y of th ma', N goes	l ar ne h Why	chitec numan y prof rong,	ture, Th genome ceins ar what i
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	PO <sub>1</sub> 3 tents:	PO2 2 2 Introd struct Geness impor bioinf Introd	Mapp PO <sub>3</sub> 2 2 1- 1- 1 ure, cont and pr tant, Ge prmatics?	PO4 PO4 2 2 Reasona Introduc cent and roteins, ene and ? to Prob	PO5 PO5 2 uble; 2 - 1 tion to t scale of Current cell r lems ar	PO6 PO6 Significan Che Basics deoxyribo knowled egulation ad Challe	PO7 PO7 at; 3 – Stro s of Molec onucleic ac lge and t , When enges in	n outcom PO <sub>8</sub> pO <sub>8</sub> ng ng ng cular Biolo cid (DNA) he 'centricell regu Bioinform	PO9 2 ogy: Ba , Histor ral dog ulation matics:	3 sic cell y of th goes Intro	l arone h Why Wr	chitec numan y prot rong, ction,	ture, Th genome what i Genome
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	PO <sub>1</sub> 3 tents:	PO2 2 2 Introd struct Geness impor bioinf Introd Trans	Mapp PO <sub>3</sub> 2 2 1- 1- ure, cont and pr tant, Ge ormatics luction criptome	PO₄ PO₄ 2 2 • Reasona • Introduc • cent and • oteins, ene and ? to Prob , Proteor	PO5 PO5 2 tion to t scale of Current cell r lems ar ne, Inter	PO6 PO6 Significan Che Basics deoxyribo knowled egulation ad Challe ference te	PO7 PO7 at; 3 – Stro s of Molec onucleic ad ge and t , When enges in echnology,	n outcom PO <sub>8</sub> PO <sub>8</sub> ng rular Biolo cid (DNA) he 'centriced' cell regu Bioinforn viruses, a	PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the	sic cell y of th ma', X goes Intro-	l ar ne h Why wr duc ne s	chitec numan y prot rong, stion,	ture, Th genome eins ar what i Genome
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	PO <sub>1</sub> 3 tents:	PO2 2 2 Introd struct Geness impor bioinf Introd Trans	Mapp PO <sub>3</sub> 2 2 1- 1- ure, cont and pr tant, Ge ormatics luction criptome luction	PO4 PO4 2 2 <b>Reasona</b> Introduce to Prob , Proteor to Artifi	PO5 PO5 2 ible; 2 – 2 tion to t scale of Current cell r lems ar ne, Inter cial Inter	PO6 PO6 Significan Che Basics deoxyribo knowled egulation nd Challe ference to elligence	PO7 PO7 at; 3 – Stro s of Molec onucleic ac lge and t , When enges in echnology, and Com	n outcom PO <sub>8</sub> PO <sub>8</sub> ng ular Biole cid (DNA) he 'centr cell regu Bioinforn , viruses, a puter Sc	PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the cience:	3 sic cell y of th ma', X goes Introo immui Introd	l arone h Why Wr ducc ne s	chitec numan y prof rong, etion, system tion to	ture, Th genome eins ar what i Genome
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont	PO <sub>1</sub> 3	PO2 2 2 Introd struct Geness impor bioinf Introd Trans Introd Search	Mapp PO <sub>3</sub> 2 1- 1- luction: I ure, cont and pr tant, Ge prmatics? luction t n algoritl	PO4 PO4 2 2 <b>Reasona</b> <b>Introduc</b> cent and coteins, ene and <b>to Prob</b> , Proteor <b>to Artifi</b> hms, He	PO5 PO5 2 ible; 2 – 3 tion to t scale of Current cell r lems ar me, Inter cial Inter uristic s	PO6 PO6 Significan Significan Che Basics deoxyribe knowled egulation d Challe ference te elligence earch me	PO7 PO7 et; 3 – Stro s of Molec onucleic ad ge and t , When enges in echnology, and Com	n outcom PO <sub>8</sub> PO <sub>8</sub> ng ular Biol cid (DNA) he 'centr cell regu Bioinforr viruses, a puter Scoptimal se	PO <sub>9</sub> PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st	sic cell y of th ma', V goes Introd immui Introd rategie	l arne h Why wr duct ne s luct	chitec numan y prot rong, ction, system tion to Proble	ture, Th genome eins ar what i Genome o search ems wit
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3	PO2 2 2 Introd struct Genes impor bioinf Introd Trans Search search	Mapp PO3 2 1- luction: I ure, cont and pr tant, Ge prmatics? luction f criptome luction f n algorith n technic	PO4 PO4 2 2 2 <b>Reasona</b> <b>Introduc</b> cent and coteins, ene and coteins, ene and <b>to Prob</b> , Proteor <b>to Artifi</b> hms, He ques, Co	PO5 PO5 2 ible; 2 – 5 tion to t scale of Current cell r lems ar ne, Inter cial Inter uristic s mplexity	PO6 PO6 Significan Significan Che Basics deoxyribo knowled egulation d Challe ference to elligence earch mo 7 of sear	PO7 PO7 at; 3 – Stro s of Molec onucleic ad ge and t , When enges in echnology, and Com ethods, Op ch, Use of	n outcom PO <sub>8</sub> PO <sub>8</sub> ng ular Biol cid (DNA) he 'centr cell regu Bioinforr viruses, a puter Scoptimal se	PO <sub>9</sub> PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st	sic cell y of th ma', V goes Introd immui Introd rategie	l arne h Why wr duct ne s luct	chitec numan y prot rong, ction, system tion to Proble	ture, Th genome eins ar what i Genome o search ems wit
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3	PO2 2 2 Introd struct Genes impor bioinf Introd Search search langua	Mapp PO3 2 2 1- 1- luction: I ure, cont and pr tant, Ge printices luction f n algorith n algorith n algorith n technic nges and a	PO4 PO4 2 2 <b>Reasona</b> <b>Introduc</b> ent and roteins, ene and to Prob , Proteon to Artifi hms, He ques, Co automata	PO5 PO5 2 ible; 2 – 3 tion to 1 scale of Current cell r lems ar ne, Inter cial Inter uristic s mplexity a, Classe	Significant Significant Significant Che Basics deoxyribo knowled egulation ad Challe ference te elligence earch me y of sear s of proble	PO7 PO7 et; 3 – Stro s of Molec onucleic ad ge and t , When enges in echnology, and Com ethods, Oj ch, Use c ems.	n outcom PO <sub>8</sub> PO <sub>8</sub> ng sular Biole cid (DNA) he 'centricell' regu Bioinforn viruses, a puter Sc ptimal se of graphs	PO <sub>9</sub> PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st s in bio	3 sic cell y of th ma', V goes Introd immu Introd rategie pinforn	l aro ne h Why wr duc ne s luct es, mati	chitec numan y prot rong, ction, system tion to Proble ics, G	ture, The genome ceins ar what is Genome o searcl ems wit rammar
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conv	PO <sub>1</sub> 3	PO2 2 2 Introd struct Geness impor bioinf Introd Search search langua Curre	Mapp PO3 PO3 2 1- 1- luction: I ure, cont and pr tant, Ge printical criptome luction f n algorith a technic ages and a nt Techn	PO4 PO4 2 2 <b>Reasona</b> <b>Introduc</b> cent and roteins, ene and <b>to Prob</b> , Proteor <b>to Artifi</b> hms, He ques, Co automata <b>iques: P</b>	PO5 PO5 2 ible; 2 – 3 tion to t scale of Current cell r lems ar ne, Inter cial Inter uristic s mplexity a, Classe robabilis	PO6 PO6 Significan Significan Significan Che Basics deoxyribo knowled egulation ad Challe ference to ference to earch mo of sear s of proble stic Appro	PO7 PO7 at; 3 – Stro s of Molec onucleic ad ge and t , When enges in echnology, and Com ethods, Op ch, Use of	n outcom PO <sub>8</sub> PO <sub>8</sub> ng sular Biole cid (DNA) he 'centricell' regu Bioinforn viruses, a puter Sc ptimal se of graphs	PO <sub>9</sub> PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st s in bio	3 sic cell y of th ma', V goes Introd immu Introd rategie pinforn	l aro ne h Why wr duc ne s luct es, mati	chitec numan y prot rong, ction, system tion to Proble ics, G	ture, The genome ceins ar what i Genome cens wit rammars
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3	PO2 2 2 3 3 4 5 5 5 5 5 5 5 5 6 7 7 7 7 7 7 7 7 7 7 7	Mapp PO <sub>3</sub> 2 2 1- 1 ure, cont and pr tant, Ge prmatics luction to algorith a algorith a technic ages and a nt Technic	PO4 PO4 2 2 Reasond Introduc cent and roteins, ene and roteins roteins, roteins roteins, roteins rotei	PO5 PO5 2 ible; 2 – 3 tion to t scale of Current cell r lems ar ne, Inter cial Inter cial Inter cial Inter cial Scale uristic s mplexity a, Classe robabilis	PO6 PO6 Significan Significan Significan Che Basics deoxyribo knowled egulation ad Challe ference to earch me of sear s of proble stic Approvers.	PO7 PO7 et; 3 – Stro s of Molec onucleic ad ge and t , When enges in echnology, and Com ethods, Op ch, Use of ems. oaches: Int	n outcom PO <sub>8</sub> PO <sub>8</sub> ng ng ng ng ng ng ng ng ng ng	es PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the sience: arch st arch st arch st an to pro	3 sic cell y of th ma', N goes Introd immu Introd rategie pinforn babilit	l arone h Why wi duct es, mati	chitec numan y prof rong, system tion to Proble ics, G Bayes' '	ture, Th genome ceins ar what i Genome o search ems wit rammars
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3	PO2 2 2 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mapp PO3 2 2 1- 1- 1 ure, cont and pr tant, Ge prmatics luction t n algorith n algorith n technic ages and a nt Technic an netwo st Neigh	PO4 PO4 2 2 Reasona Introduce tent and toteins, ene and to Prob , Proteor to Artifi hms, He ques, Co automata iques: P porks, Mar bor and	PO5 PO5 2 ible; 2 – 3 tion to t scale of Current cell r lems ar ne, Inter cial Inter cial Inter uristic s mplexity a, Classe kov netw Cluster	PO6 PO6 Significan Significan Che Basics deoxyribo knowled egulation d Challe ference to earch me of sear s of proble stic Approvers. ring Appr	PO7 PO7 et; 3 – Stro s of Molec onucleic ad lge and t , When enges in echnology, and Com ethods, Op ch, Use of ems. oaches: Int	n outcom PO <sub>8</sub> PO <sub>8</sub> ng rular Biolo cid (DNA) he 'centr cell regu Bioinforn viruses, a puter So ptimal se of graphs roduction	es PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st ; in bid n to pro	3 sic cell y of th ma', V goes Introd immui Introd rategie binform babilit	l aro ne h Why wr duct es, nati	chitec numan y prof rong, system tion to Proble ics, G Bayes' '	ture, Th genome eins ar what i Genome
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3	PO2 2 2 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mapp PO <sub>3</sub> 2 1- 1- luction: I ure, cont and pr tant, Ge ormatics? luction criptome luction to algorith a logorith a logorith a technic ages and a nt Technic an netwo st Neigh	PO₄ PO₄ 2 2 Reasona Introduc ent and roteins, ene and roteins	PO5 PO5 2 ible; 2 – 2 tion to t scale of Current cell r lems ar ne, Inter cial Inter cial Inter cial Inter cial Scale uristic s mplexity a, Classes kov netw Cluster oach for	PO6 PO6 Significan Significan Che Basics deoxyribe knowled egulation d Challe ference to elligence earch mo 7 of sear s of proble stic Appro vorks. ing Appr secondar	PO7 PO7 et; 3 – Stro s of Molect onucleic ad lge and t , When enges in echnology, and Com ethods, Op ch, Use c ems. oaches: Int roaches: Int	n outcom PO <sub>8</sub> PO <sub>8</sub> ng rular Biole cid (DNA) he 'centricell' regu Bioinforn viruses, a puter Sco ptimal see of graphs rroduction htroduction	es PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st ; in bid n to pro	3 sic cell y of th ma', V goes Introd immui Introd rategie binform babilit	l aro ne h Why wr duct es, nati	chitec numan y prof rong, system tion to Proble ics, G Bayes' '	ture, Th genome eins ar what i Genome
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3	PO2 2 2 3 3 4 5 5 5 5 5 5 5 5 5 6 7 7 7 7 7 7 7 7 7 7	Mapp PO3 PO3 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1-	PO4 PO4 2 2 2 <b>Reasona</b> <b>Introduc</b> cent and coteins, ene and coteins c	PO5 PO5 2 ible; 2 – 3 tion to t scale of Current cell r lems ar ne, Inter cial Inter cial Inter cial Inter cial Second uristic s mplexity a, Classe robabilis kov netw Cluster oach for chniques	PO6 PO6 Significan Significan Che Basics deoxyribe knowled egulation d Challe ference te elligence earch me of sear s of proble stic Appro vorks. ing Appr secondar , Applicat	PO7 PO7 PO7 s of Molec onucleic ad ge and t , When enges in echnology, and Com ethods, Op ch, Use of ems. paches: Int ry structur ion guideli	n outcom PO <sub>8</sub> PO <sub>8</sub> ng ular Biol cid (DNA) he 'centricell' regu Bioinforn viruses, a puter Scoptimal see of graphs roduction htroduction nes.	PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the sience: arch sta in bio n to pro-	3 sic cell y of th ma', V goes Introd immui Introd rategia binform babilit rest N g prec	l arone h Why wr duct es, mati	chitec numan y prot rong, system tion, to Proble ics, G Bayes' ' hbour ion, C	ture, Th genome eins ar what i Genome be search ems wit rammar Theoren methoo
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3	PO2 2 2 3 3 4 5 5 5 5 5 5 5 5 6 7 7 7 7 7 7 7 7 7 7 7	Mapp PO3 PO3 2 1- 1- luction: I ure, cont and pr tant, Ge prmatics? luction f n algorith a logorith a technic ages and a nt Technic an networ st Neigh st neight ced clust on Trees	PO4 PO4 2 2 2 <b>Reasona</b> <b>Introduc</b> cent and coteins, ene and coteins, ene and <b>to Prob</b> , Proteor <b>to Artifi</b> hms, He ques, Co automata <b>iques: P</b> porks, Mar bor and cor appro- cering tec <b>s:</b> Metho	PO5 PO5 2 ible; 2 – 3 tion to t scale of Current cell r lems ar ne, Inter cial Inter uristic s mplexity a, Classe robabilis kov netw Cluster cach for chniques od, Gain	PO6 PO6 Significan Significan Che Basics deoxyribe knowled egulation d Challe ference te elligence earch me of sear s of proble stic Appro vorks. ing Appr secondar , Applicat	PO7 PO7 et; 3 – Stro s of Molect onucleic ad lge and t , When enges in echnology, and Com ethods, Op ch, Use c ems. oaches: Int roaches: Int	n outcom PO <sub>8</sub> PO <sub>8</sub> ng ular Biol cid (DNA) he 'centricell' regu Bioinforn viruses, a puter Scoptimal see of graphs roduction htroduction nes.	PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the sience: arch sta in bio n to pro-	3 sic cell y of th ma', V goes Introd immui Introd rategia binform babilit rest N g prec	l arone h Why wr duct es, mati	chitec numan y prot rong, system tion, to Proble ics, G Bayes' ' hbour ion, C	ture, Th genome eins ar what i Genome b search ems wit cammars Theoren methoo
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3	PO2 2 2 3 3 4 5 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Mapp PO3 PO3 2 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1-	PO4 PO4 2 2 2 <b>Reasona</b> <b>Introduc</b> ent and roteins, ene and roteins, ene and <b>to Prob</b> , Proteor to Artifi hms, He ques, Co automata iques; Pro porks, Mar bor appro- tering tec s: Metho applicati	PO5 PO5 2 ible; 2 – 3 tion to t scale of Current cell r lems ar ne, Inter cial Inter uristic s mplexity a, Classer kov netw Cluster oach for chniques od, Gain ons.	PO6 PO6 Significan Significan Che Basics deoxyribo knowled egulation d Challe ference te elligence earch me of sear s of proble stic Appro vorks. ing Appr secondar , Applicat criterion	PO7 PO7 endest port; 3 – Stro port; 4 – Stro port;	n outcom PO <sub>8</sub> PO <sub>8</sub> ng ular Biole cid (DNA) he 'centricell' regu Bioinform viruses, a puter Sc ptimal se of graphs roduction ntroduction nes. ing and	PO <sub>9</sub> PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st in bio n to pro on, Nea n foldin pruning	3 sic cell y of th ma', V goes Introd rategio pinform babilit rest N g prec	l arme h Why wr ducc ne s fluct es, mati	chitec numan y prot rong, ction, system ion to Proble ics, G Bayes'' hbour ion, C tion g	ture, Th genome ceins ar what i Genome  o search ems wit rammars Theoren methoo ustering uidelines
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3	PO2 2 2 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mapp PO3 PO3 2 1- luction: I ure, cont and pr tant, Ge ormatics? luction f algorith a lgorith a	PO4 PO4 2 2 2 Reasona Introduc cent and roteins, ene and roteins roteins, ene and roteins rote	PO5 PO5 2 ible; 2 – 3 tion to 1 scale of Current cell r lems ar ne, Inter cial Inter cia	PO6 PO6 Significan Significan Che Basics deoxyribo knowled egulation d Challe ference te elligence earch me of sear s of proble stic Appro vorks. ing Appr secondar , Applicat criterion	PO7 PO7 PO7 s of Molec onucleic ad ge and t , When enges in echnology, and Com ethods, Op ch, Use of ems. paches: Int ry structur ion guideli	n outcom PO <sub>8</sub> PO <sub>8</sub> ng ular Biole cid (DNA) he 'centricell' regu Bioinform viruses, a puter Sc ptimal se of graphs roduction ntroduction nes. ing and	PO <sub>9</sub> PO <sub>9</sub> 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st in bio n to pro on, Nea n foldin pruning	3 sic cell y of th ma', V goes Introd rategio pinform babilit rest N g prec	l arme h Why wr ducc ne s fluct es, mati	chitec numan y prot rong, ction, system ion to Proble ics, G Bayes'' hbour ion, C tion g	ture, Th genome ceins ar what i Genome  o search ems with rammars Theorem methoo ustering uidelines
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit: Unit:	PO <sub>1</sub> 3 3 tents: :1 :2 :3	PO2 2 2 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mapp PO3 PO3 2 1- luction: I ure, cont and pr tant, Ge ormatics luction f a algorith a technic oriptome luction f a algorith a technic origes and a nt Technic an netwo st Neight ced clust on Trees ormatics I Netwo ations, Ba	PO4 PO4 2 2 Reasona Introduc ent and roteins, ene and roteins, roteo roteins, ene and roteins, roteo roteins, ene and roteins, roteo roteins, ene and roteins rotei	PO5 PO5 2 ible; 2 – 3 tion to 1 scale of Current cell r lems ar ne, Inter cial Inter uristic s mplexity a, Classes robabilis kov netw Cluster oach for chniques od, Gain ions. Genetic ad.	PO6 PO6 Significan Significan Significan Significan Significan Che Basics deoxyribo knowled egulation ad Challe ference te earch me of sear s of proble stic Approving vorks. ing Appr secondar , Applicat criterion	PO7 PO7 PO7 s of Molect onucleic ad ge and t , When enges in echnology, and Com ethods, Op ch, Use of ems. paches: Int ry structur ion guideli , Over fitt ms: Metho	n outcom PO <sub>8</sub> PO <sub>8</sub> ng rular Biole cid (DNA) he 'centricell' regu Bioinform viruses, a puter Scoptimal see of graphs rroduction ntroduction nes. ing and job od, Applic	PO9 PO9 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st s in bid n to pro on, Nea n foldin pruning ation g	3 sic cell y of th ma', V goes Introd immu Introd rategio pinform babilit rest N g prec g, Appl uidelin	ll arther h Why wr duct es, nati y, B licat licat	chitec numan y prot rong, ction, system tion to Proble ics, G Bayes' ' hbour ion, C tion g Bioin	ture, The genome ceins ar what is Genome cons wit rammars Theoren methoo ustering uidelines
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit:	PO <sub>1</sub> 3 3 tents: :1 :2 :3	PO2 2 2 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mapp PO3 PO3 2 1- 1- luction: I ure, cont and pr tant, Ge ormatics luction f a algorith a technic ages and a nt Technic an netwo st Neight ced clust on Trees ormatics I Netwo ations, Ba ic Algor	PO4 PO4 2 2 2 Reasona Introduc cent and roteins, ene and roteins, roteo rotes, mathemathemathemathemathemathemathemathe	PO5 PO5 2 ible; 2 – 3 tion to t scale of Current cell r lems ar ne, Inter cial Inter uristic s mplexity a, Classe robabilis kov netw Cluster oach for chniques od, Gain ions. Genetic ad. Single-ob	PO6 PO6 Significan Significan Significan Significan Significan Che Basics deoxyribo knowled egulation ad Challe ference to earch mo of sear s of proble stic Appro vorks. Ting Appr secondar , Applicat criterion Algorithm	PO7 PO7 PO7 et; 3 – Stro s of Molect onucleic ad ge and t , When enges in echnology, and Com ethods, Op ch, Use of ems. paches: Int ry structur ion guideli , Over fitt ms: Methor	n outcom PO <sub>8</sub> PO <sub>8</sub> ng rular Biole cid (DNA) he 'centricell' regu Bioinform viruses, a puter Sci puter Sci pu	PO9 PO9 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st s in bid n to pro on, Nea n foldin pruning ation g -metho	3 sic cell y of th ma', V goes Introd immu Introd rategio binforn babilit rest N g prec g, Appl uidelin	ll arther h Why wr duct es, nati y, B Jeig dicti licat	chitec numan y prot rong, ction, system tion to Proble ics, G Bayes' hbour ion, C tion g Bioin Xampl	ture, The genome what i Genome besearchers with cammars Theorem method ustering uidelines formatic
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Cont Unit: Unit:	PO <sub>1</sub> 3 3 tents: :1 :2 :3	PO2 2 2 2 Introd struct Genes impor bioinf Introd Trans Introd Search langua Curre Bayes Neare Advan Decis Bioinf Neura applic Genet object	Mapp PO3 PO3 2 1- 1- luction: I ure, cont and pr tant, Ge ormatics luction f a algorith a technic ages and a nt Technic an netwo st Neight ced clust on Trees ormatics I Netwo ations, Ba ic Algor	PO4 PO4 2 2 Reasona Introduc cent and roteins, ene and roteins ene and roteins ene and roteins ene and roteins ene and roteins ene roteins ene and roteins ene and roteins en	PO5 PO5 2 ible; 2 – 3 tion to t scale of Current cell r lems ar ne, Inter cial Inter cia	PO6 PO6 Significan Significan Significan Significan Significan Che Basics deoxyribo knowled egulation ad Challe ference to earch mo of sear s of proble stic Appro vorks. Ting Appr secondar , Applicat criterion Algorithm	PO7 PO7 PO7 s of Molect onucleic ad ge and t , When enges in echnology, and Com ethods, Op ch, Use of ems. paches: Int ry structur ion guideli , Over fitt ms: Metho	n outcom PO <sub>8</sub> PO <sub>8</sub> ng rular Biole cid (DNA) he 'centricell' regu Bioinform viruses, a puter Sci puter Sci pu	PO9 PO9 2 ogy: Ba , Histor ral dog ulation matics: and the cience: arch st s in bid n to pro on, Nea n foldin pruning ation g -metho	3 sic cell y of th ma', V goes Introd immu Introd rategio binforn babilit rest N g prec g, Appl uidelin	ll arther h Why wr duct es, nati y, B Jeig dicti licat	chitec numan y prot rong, ction, system tion to Proble ics, G Bayes' hbour ion, C tion g Bioin Xampl	ture, The genome what is Genome besearchers wit cammars Theorem methoo ustering uidelines formatic

	applications, Background.
	Cellular Automata: Method, Application guidelines, Bioinformatics applications, Background.
	Hybrid Methods: Method, Neural-genetic algorithm for analyzing gene expression data,
	Genetic algorithm, and k nearest neighbor hybrid for biochemistry solvation, Genetic
	programming neural networks for determining gene -gene interactions in epidemiology,
	Application guidelines, Conclusions.
Exan	nination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class sessional
exam	ns/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
exam	nination.
Text	Books:
1	Edward Keedwell and Ajit Narayanan, —Intelligent BioinformaticsI, Wiley, First Edition, 2005.
2	Gary B. Fogel, David W. Corne, Yi Pan, —Computational Intelligence in BioinformaticsI, Wiley-IEEE Press, First
	Edition, 2010.
Refe	rence Books:
1	Jin Xiong, —Essential BioinformaticsI, Cambridge University Press, First Edition, 2006.
2	Supratim Choudhuri, —Bioinformatics for Beginners Academic Press, First Edition, 2014.

MTCS343	ode			<b></b>	Course '				1	ture	~	
	SPET		<b>P</b> 1			Analysis	11 0000		L	T P	Sem	ester: III
Version: 1.2	<u> </u>			e of App	<b>roval:</b> 161	th BoS 17-			4	0 0		
NT -	Scheme							Scheme o				100
	of Periods ds/Week	: 60	Hrs.							n Score		100 30
Period	Credits	· 4 : 4						me		aluation emester		30 70
Instruct	ion Mode		ture							ouration		3 Hrs.
Prerequisite(s				ic know	ledge of	linear alg	ebra, calcu					
(Python, MATL				10 1010	louge of	unear ang	obru, cuica	ius, prose	ionity t	neerj, un		5
Course Object		/										
1. Understan	d the prin	ciples of	digital ir	nage pro	ocessing.							
2. Implemen												
3. Extract m							ification ar	nd recogn	ition.			
4. Evaluate a		e differe	ent image	e proces	sing algo	rithms.						
Course Outcon	nes (CO):				Ct at a ma					14.		
COs No.					Statem	ent						Program es (POs)
CO <sub>1</sub>	Learning	how to	y apply	digital ir	nade and	lysis tec	hniques to	solve re	al-wor		PO <sub>1</sub> ,	· /
COI							biology,				<b>I</b> OI,	102
	compute			orab, ba		neurenre,	210108),	engineer				
CO <sub>2</sub>				mental	concepts	and tech	niques of	image pro	ocessin	g,	<b>PO</b> <sub>2</sub> ,	PO <sub>3</sub>
	such as i	mage en	hancem	ent, rest	oration,	segmenta	ition, featu	re extrac	tion, ar	id		
	classifica											
CO <sub>3</sub>							ges of digit	al image	analysi	s,	<b>PO</b> <sub>4</sub> ,	$PO_5$
	including						•	1 1	1	1 20		
<b>CO</b> <sub>4</sub>						l skills to	interpret a	ind analyz	ze digit	al <b>PC</b>	<b>)</b> <sub>4</sub> , PO	9, <b>PO</b> 10
<b>PO</b> 1- Engineerin	images a					/dovelopr	nont of colu	tions DO	Condu	at invoctio	ationa	of comple
problems, <b>PO</b> <sub>5</sub> -												
or team work, <b>P</b>										-	,	
	1		Марр	ing of co	ourse out	comes wi	th program			1		
Course	PO <sub>1</sub>	PO <sub>2</sub>	Марр <b>РО</b> 3	PO <sub>4</sub>	ourse out PO₅	PO <sub>6</sub>	th program <b>PO</b> 7			<b>PO</b> <sub>10</sub>	PO <sub>11</sub>	PO <sub>12</sub>
Outcomes								n outcom	es	PO <sub>10</sub>	PO <sub>11</sub>	PO <sub>12</sub>
Outcomes CO <sub>1</sub>	<b>PO</b> <sub>1</sub>	2	PO <sub>3</sub>					n outcom	es	PO <sub>10</sub>	PO <sub>11</sub>	PO <sub>12</sub>
Outcomes           CO1           CO2				PO <sub>4</sub>	PO <sub>5</sub>			n outcom	es	PO <sub>10</sub>	PO <sub>11</sub>	PO <sub>12</sub>
Outcomes           CO1           CO2           CO3		2	PO <sub>3</sub>	<b>PO</b> <sub>4</sub>				n outcom	es PO <sub>9</sub>		PO <sub>11</sub>	PO <sub>12</sub>
Outcomes CO <sub>1</sub> CO <sub>2</sub>		2	<b>PO</b> <sub>3</sub>	<b>PO</b> <sub>4</sub>	<b>PO</b> <sub>5</sub>	PO <sub>6</sub>	PO <sub>7</sub>	n outcom PO <sub>8</sub>	es	<b>PO</b> <sub>10</sub>	PO <sub>11</sub>	PO <sub>12</sub>
Outcomes           CO1           CO2           CO3           CO4	3	2	<b>PO</b> <sub>3</sub>	<b>PO</b> <sub>4</sub>	<b>PO</b> <sub>5</sub>	PO <sub>6</sub>		n outcom PO <sub>8</sub>	es PO <sub>9</sub>		PO	PO <sub>12</sub>
Outcomes           CO1           CO2           CO3           CO4	3	2 2	PO <sub>3</sub>	<b>PO</b> <sub>4</sub> 2 2 <b>Reason</b>	<b>PO</b> <sub>5</sub>	PO <sub>6</sub>	PO <sub>7</sub>	PO <sub>8</sub>	es PO <sub>9</sub>	3		
Outcomes           CO1           CO2           CO3           CO4	a 3	2 2 Introdu represe	PO <sub>3</sub> 2 1- uction to entation	PO <sub>4</sub> 2 2 Reason Digital Basic	PO <sub>5</sub>	PO <sub>6</sub> Significar ocessing, operatio	PO <sub>7</sub> t; 3 – Stron Overview ns; Image	n outcom PO <sub>8</sub> y ng of digital e Enhan	es PO <sub>9</sub> 2 image	3 processir	ng, Dig	ital imag
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conto	a 3	2 2 Introdu represe technic	PO <sub>3</sub> 2 1 - uction to entation, ques, His	PO <sub>4</sub> 2 2 Reasona Digital Basic ttogram	PO <sub>5</sub>	PO <sub>6</sub> Significan rocessing, operatio cion, Spati	PO <sub>7</sub> et; 3 – Strog Overview ns; Image al domain	n outcom PO <sub>8</sub> yg of digital e Enhan filtering	es PO <sub>9</sub> 2 image	3 processir , Image	ng, Dig enh	ital imag ancemen
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit:	3 ents:	2 2 Introdu represe technic Image	PO <sub>3</sub> 2 1 - uction to entation ques, His Segme	PO <sub>4</sub> 2 2 Reasona Digital Basic ttogram	PO <sub>5</sub>	PO <sub>6</sub> Significan rocessing, operatio cion, Spati	PO <sub>7</sub> t; 3 – Stron Overview ns; Image	n outcom PO <sub>8</sub> yg of digital e Enhan filtering	es PO <sub>9</sub> 2 image	3 processir , Image	ng, Dig enh	ital imag ancemen
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit:	3 ents: 1	2 2 Introdu represe technic Image segmen	PO <sub>3</sub> 2 1 - uction to entation ques, His Segme ntation	PO <sub>4</sub> 2 2 Reason Digital Basic togram ntation,	PO5 2 able; 2 – 3 Image Pr image equalizat Image	PO <sub>6</sub> Significar ocessing, operatio cion, Spati thresho	PO <sub>7</sub> at; 3 – Stron Overview ns; Image al domain Iding, Reg	n outcom PO <sub>8</sub> of digital e Enhan filtering gion-base	es PO <sub>9</sub> 2 image p cement ed seg	3 processir , Image mentatio	ng, Dig enh n, Ec	ital imag ancemen lge-base
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit:	3 ents: 1	2 2 Introdu repress technic Image segmen Feature	PO <sub>3</sub> 2 1 - uction to entation gues, His Segme ntation e Extract	PO <sub>4</sub> 2 2 P Digital Basic Stogram Intation, Fea	PO5 2 able; 2 - 1 Image Pr image equalizat Image ture repu	PO <sub>6</sub> Significar ocessing, operatio cion, Spati thresho	PO <sub>7</sub> bt; 3 – Strog Overview ns; Image al domain Iding, Reg on, Feature	n outcom PO <sub>8</sub> of digital e Enhan filtering gion-base extractio	es PO <sub>9</sub> 2 image j cement ed seg	3 processir , Image mentatio niques, Fe	ng, Dig enh n, Ec eature	ital imag ancemen lge-base selection
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: Unit:	3 ents: 1	2 2 Introdu represe technie Image segmen Feature Classifi	PO <sub>3</sub> 2 1- uction to entation ques, His Segme ntation e Extract ication,	PO <sub>4</sub> 2 2 P Digital Basic togram ntation, tion, Fea Supervi	PO <sub>5</sub> 2 able; 2 - 5 Image Pr image equalizat Image ture repr ised an	PO <sub>6</sub> Significar ocessing, operatio cion, Spati thresho resentatic d unsup	PO7 ett; 3 – Strop Overview ns; Image al domain Iding, Reg on, Feature ervised c	n outcom PO <sub>8</sub> of digital e Enhan filtering gion-base extractio lassificati	es PO <sub>9</sub> 2 image j cement cement d seg	3 processir , Image mentatio niques, Fe assificati	ng, Dig enh n, Ec eature on al	ital imag ancemen Ige-base selection gorithms
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit:	3 ents: 1	2 2 Introdu represe technic Image segmen Feature Classifi Evaluat	PO <sub>3</sub> 2 1 - uction to entation ques, His Segme ntation e Extract ication, tion met	PO <sub>4</sub> 2 2 Reason Digital Basic togram ntation, tion, Fea Superv rics; Ob	PO <sub>5</sub> 2 able; 2 - 5 Image Pr image equalizat Image ture repr ised an	PO <sub>6</sub> Significar ocessing, operatio cion, Spati thresho resentatic d unsup	PO <sub>7</sub> bt; 3 – Strog Overview ns; Image al domain Iding, Reg on, Feature	n outcom PO <sub>8</sub> of digital e Enhan filtering gion-base extractio lassificati	es PO <sub>9</sub> 2 image j cement cement d seg	3 processir , Image mentatio niques, Fe assificati	ng, Dig enh n, Ec eature on al	ital imag ancemen Ige-base selection gorithms
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: Unit:	3 ents: 1	2 2 Introdu represe technic Image segmen Feature Classifi Evaluar Object	PO <sub>3</sub> 2 1 - uction to entation ques, His Segme ntation e Extract ication, tion met detection	PO <sub>4</sub> 2 2 Reasona Digital Basic togram ntation, tion, Fea Superv rics; Ob	PO <sub>5</sub> 2 able; 2 – 2 Image Pr image equalizat Image ture repr ised an- ject Reco	PO <sub>6</sub> Significan rocessing, operatio cion, Spati thresho resentatic d unsup ognition, (	PO <sub>7</sub> t; 3 – Strog Overview ns; Image al domain Iding, Reg on, Feature ervised c Object reco	n outcom PO <sub>8</sub> of digital e Enhan filtering gion-base extractio lassificati ognition t	es PO <sub>9</sub> 2 image cement ed seg n techr on, Cl cechniq	3 processir , Image mentatio niques, Fe assificati ues, Tem	ng, Dig enh n, Eo eature on al plate	ital imag ancemen lge-base selection gorithms matching
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: 2 Unit: 2 Unit: 4	2 3 4	2 2 Introdu represe technic Image segmen Feature Classifi Evaluat Object Machir	PO <sub>3</sub> 2 1- uction to entation. ques, His Segme ntation e Extract ication, tion met detection ne Learn	PO <sub>4</sub> 2 2 Reasona Digital Basic togram ntation, Fea Superv rics; Ob m ing for	PO <sub>5</sub> 2 able; 2 – 3 Image Pr image equalizat Image ture repr ised an ject Reco	PO <sub>6</sub> Significar rocessing, operatio cion, Spati thresho resentatic d unsup ognition, o	PO <sub>7</sub> ett; 3 – Stron Overview ns; Image al domain Iding, Reg n, Feature ervised c Object reco troduction	n outcom PO <sub>8</sub> of digital e Enhan filtering gion-base extractio lassificati ognition t	es PO <sub>9</sub> 2 image cement ed seg n techr on, Cl techniq	3 processir , Image mentatio niques, Fe assificati ues, Tem rning, Cl	ng, Dig enh n, Ec eature on al plate	ital imag ancemen lge-base selection gorithms matching ation an
Outcomes CO1 CO2 CO3 CO4 Detailed Contro Unit: Unit:	2 3 4	2 2 Introdu represe technic Image segmen Featur Classifi Evaluat Object Machir regress	PO <sub>3</sub> 2 1- uction to entation. ques, His Segme ntation e Extract ication, tion met detection ne Learn	PO <sub>4</sub> 2 2 Reasonation Digital Basic togram ntation, Fea Superver rics; Ob on ing for ture lea	PO <sub>5</sub> 2 able; 2 - 3 Image Pr image equalizat Image ture repr ised an ject Reco Image An rning; Ap	PO <sub>6</sub> Significar rocessing, operatio cion, Spati thresho resentatic d unsup ognition, o	PO <sub>7</sub> t; 3 – Strog Overview ns; Image al domain Iding, Reg on, Feature ervised c Object reco	n outcom PO <sub>8</sub> of digital e Enhan filtering gion-base extractio lassificati ognition t	es PO <sub>9</sub> 2 image cement ed seg n techr on, Cl techniq	3 processir , Image mentatio niques, Fe assificati ues, Tem rning, Cl	ng, Dig enh n, Ec eature on al plate	ital imag ancemen lge-base selection gorithms matching ation and
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: 2 Unit: 2 Unit: 4	a 3 b 1 cents: 1 2 3 4 5	2 2 Introdu represe technic Image segmen Feature Classifi Evaluat Object Machir regress Remote	PO <sub>3</sub> 2 1- uction to entation. ques, His Segme ntation e Extract ication, tion met detection ne Learn sion, Fea e sensing	PO <sub>4</sub> 2 2 Reason Digital Basic togram ntation, Fea Superv rics; Ob n ing for ture lea g, Survei	PO <sub>5</sub> 2 able; 2 – 3 Image Pr image equalizat Image ture repr ised an ject Reco Image Ar rning; Ap Ilance	PO <sub>6</sub> Significar rocessing, operatio cion, Spati thresho resentatic d unsup ognition, o nalysis, In oplication	PO <sub>7</sub> et; 3 – Stron Overview ns; Image al domain Iding, Reg en, Feature ervised c Object reco troduction s of Digita	n outcom PO <sub>8</sub> of digital e Enhan filtering gion-base extractio lassificati ognition t a to mach l Image A	es PO <sub>9</sub> 2 image cement ed seg n techr on, Cl cechniq ine lea	3 processir , Image mentatio niques, Fe assificati ues, Tem rning, Cl	ng, Dig enh n, Ec eature on al plate image	ital imag ancemen lge-base selection gorithms matching ation and e analysis
Outcomes CO1 CO2 CO3 CO4 Detailed Contr Unit: Unit: Unit: Unit: Cuni	2 3 4 5 and Evalua	2 2 Introdu represe technie Image segmen Feature Classifi Evaluat Object Machir regress Remot	PO <sub>3</sub> 2 1 - uction to entation ques, His Segme ntation e Extract ication, tion met detection tion met detection ne Learn sion, Fea e sensing ttern: It	PO <sub>4</sub> 2 2 Reasonation Digital Basic togram Intation, Fea Superv rics; Ob on ing for iture lea g, Survei include	PO <sub>5</sub> 2 able; 2 - 3 Image Pr image equalizat Image ture repl ised an ject Reco Image An rning; Aj <u>llance</u> both int	PO <sub>6</sub> Significar rocessing, operatio cion, Spati thresho resentatic d unsup ognition, o nalysis, In oplication ternal eva	PO <sub>7</sub> et; 3 – Stron Overview ns; Image al domain Iding, Reg on, Feature ervised c Dbject reco troduction s of Digita	n outcom PO <sub>8</sub> PO <sub>8</sub> ng of digital e Enhan filtering gion-base extractio lassificati ognition to a to mach l Image A D marks)	es PO <sub>9</sub> 2 image j cement ed seg n techr on, Cl cechniq nine lea nalysis compr	3 processir , Image mentatio niques, Fe assificati ues, Tem rning, Cl Medical ising two	ng, Dig enh n, Ec eature on al plate assific image	ital imag ancemen lge-base selection gorithms matching ation and e analysis sessiona
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: Unit: Unit: Unit: Examination a exams/ assign examination.	2 3 4 5 and Evalua	2 2 Introdu represe technie Image segmen Feature Classifi Evaluat Object Machir regress Remot	PO <sub>3</sub> 2 1 - uction to entation ques, His Segme ntation e Extract ication, tion met detection tion met detection ne Learn sion, Fea e sensing ttern: It	PO <sub>4</sub> 2 2 Reasonation Digital Basic togram Intation, Fea Superv rics; Ob on ing for iture lea g, Survei include	PO <sub>5</sub> 2 able; 2 - 3 Image Pr image equalizat Image ture repl ised an ject Reco Image An rning; Aj <u>llance</u> both int	PO <sub>6</sub> Significar rocessing, operatio cion, Spati thresho resentatic d unsup ognition, o nalysis, In oplication ternal eva	PO <sub>7</sub> et; 3 – Stron Overview ns; Image al domain Iding, Reg on, Feature ervised c Dbject reco troduction s of Digita	n outcom PO <sub>8</sub> PO <sub>8</sub> ng of digital e Enhan filtering gion-base extractio lassificati ognition to a to mach l Image A D marks)	es PO <sub>9</sub> 2 image j cement ed seg n techr on, Cl cechniq nine lea nalysis compr	3 processir , Image mentatio niques, Fe assificati ues, Tem rning, Cl Medical ising two	ng, Dig enh n, Ec eature on al plate assific image	ital imag ancemen lge-base selection gorithms matching ation and e analysis sessiona
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: Unit: Unit: Unit: Examination a exams/ assign examination. Text Books:	3 ents: 1 2 3 4 5 mod Evalua ments/ qu	2 2 Introdu represe technid Image segmen Feature Classifi Evaluat Object Machir regress Remot tion Pat	PO <sub>3</sub> 2 1- uction to entation ques, His Segme ntation e Extract ication, tion met detection te Learn sion, Fea e sensing ttern: It inar pres	PO <sub>4</sub> 2 2 Reasona Digital Basic togram ntation, Fea Superv rics; Ob n ing for iture lea g, Survei include sentation	PO <sub>5</sub> 2 able; 2 – 3 Image Pr image equalizat Image ture repu ised an ject Reco Image An rning; Ap llance both into n etc. and	PO <sub>6</sub> Significar rocessing, operatio cion, Spati thresho resentatic d unsup ognition, o nalysis, In oplication ternal eva l external	PO <sub>7</sub> ett; 3 – Strog Overview ns; Image al domain Iding, Reg on, Feature ervised c Object reco troduction s of Digita evaluation (30 evaluation	n outcom PO <sub>8</sub> PO <sub>8</sub> ng of digital e Enhan filtering gion-base extractio lassificati ognition to a to mach l Image A D marks)	es PO <sub>9</sub> 2 image j cement ed seg n techr on, Cl cechniq nine lea nalysis compr	3 processir , Image mentatio niques, Fe assificati ues, Tem rning, Cl Medical ising two	ng, Dig enh n, Ec eature on al plate assific image	ital imag ancemen Ige-base selection gorithms matching ation and e analysis sessiona
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: Unit: Unit: Unit: Cuni	3 ents: 1 2 3 4 5 md Evalua ments/ qu nage Proce	2 2 Introdu represe technid Image segmen Feature Classifi Evaluar Object Machir regress Remot tion Pat	PO <sub>3</sub> 2 1- uction to entation. ques, His Segme ntation e Extract ication, tion met detection te Learn sion, Fea e sensing ttern: It inar pres	PO <sub>4</sub> 2 2 Reason Digital Basic togram ntation, Fea Superv rics; Ob m ing for iture lea g, Survei include sentation C. Gonza	PO <sub>5</sub> 2 able; 2 – 3 Image Pr image equalizat Image Pr image An rimage An rning; Ap llance both int n etc. and alez and	PO <sub>6</sub> Significar rocessing, operatio cion, Spati thresho resentatic d unsup ognition, o nalysis, In oplication ternal eva l external Richard E	PO <sub>7</sub> tt; 3 – Stron Overview ns; Image al domain Iding, Reg n, Feature ervised c Object reco troduction s of Digita iluation (30 evaluation . Woods.	n outcom PO <sub>8</sub> PO <sub>8</sub> of digital e Enhan filtering gion-base extractio lassificati ognition to a to mach l Image A 0 marks) (70 marks)	es PO <sub>9</sub> 2 image cement ed seg n techr on, Cl cechniq ine lea analysis compri- s) whic	3 processir , Image mentatio niques, Fe assificati ues, Tem rning, Cl Medical ising two h is main	ng, Dig enh n, Ec eature on al plate assific image	ital imag ancemen lge-base selection gorithms matching ation and e analysis sessiona
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: Unit: Unit: Unit: Cunit: Cunit: Cunit: Unit: Unit: Cunit:	and Evalua ments/ qu nage Proce	2 2 Introdu represe technid Image segmen Feature Classifi Evaluar Object Machir regress Remot tion Pat	PO <sub>3</sub> 2 1- uction to entation. ques, His Segme ntation e Extract ication, tion met detection te Learn sion, Fea e sensing ttern: It inar pres	PO <sub>4</sub> 2 2 Reason Digital Basic togram ntation, Fea Superv rics; Ob m ing for iture lea g, Survei include sentation C. Gonza	PO <sub>5</sub> 2 able; 2 – 3 Image Pr image equalizat Image Pr image An rimage An rning; Ap llance both int n etc. and alez and	PO <sub>6</sub> Significar rocessing, operatio cion, Spati thresho resentatic d unsup ognition, o nalysis, In oplication ternal eva l external Richard E	PO <sub>7</sub> ett; 3 – Strog Overview ns; Image al domain Iding, Reg on, Feature ervised c Object reco troduction s of Digita evaluation (30 evaluation	n outcom PO <sub>8</sub> PO <sub>8</sub> of digital e Enhan filtering gion-base extractio lassificati ognition to a to mach l Image A 0 marks) (70 marks)	es PO <sub>9</sub> 2 image cement ed seg n techr on, Cl cechniq ine lea analysis compri- s) whic	3 processir , Image mentatio niques, Fe assificati ues, Tem rning, Cl Medical ising two h is main	ng, Dig enh n, Ec eature on al plate assific image	ital imag ancemen Ige-base selection gorithms matching ation and e analysis sessiona

2 Pattern Recognition and Machine Learning" by Christopher M. Bishop.

Course C				- 1	Course				_	ecture	-	~	
MTCS344	PET		D.4			Computing         L         T           th BoS 17-11-2022         4         0					P	Sen	nester: III
Version: 1.2	Sahama	of Instr		e of App	roval: 16	th BoS 1/-		Scheme o	4	0	0		
No. c	f Periods		Hrs.				Ň			um Sco		•	100
	ls/Week	: 4	1115.							valuati			30
1 01100	Credits	: 4						inte		Semes			70
Instruct	on Mode		ture							Durati			3 Hrs.
Prerequisite(s)													
Course Objecti		0											
<ol> <li>Identify th computing</li> <li>Understan</li> <li>Learn abou</li> <li>Gain pract</li> </ol>	and mobi d the impo it the vario ical experi	le comportance o Dous hard	uting. of securi ware and	ty and p d softwa	rivacy in re archit	edge and ectures u	fog compu sed in edge	iting. e and fog	comp	ıting.	igms	such	as cloud
COurse Outcon COs No.	les(CO):				Statem	~~ <b>t</b>					Ma	mmadi	
COS NO.					Statem	ent							Program es (POs)
CO <sub>1</sub>							ing concep ncepts and				00	PO <sub>1</sub> ,	
	underpir												
CO <sub>2</sub>	edge and	l fog cor	design and deploy edge and fog computing solutions: By studying <b>PO<sub>2</sub>, PO<sub>3</sub></b> og computing, you can learn how to design and deploy edge and fog solutions that meet specific business needs.										PO <sub>3</sub>
CO <sub>3</sub>	Improve	d efficie ng are	ncy and designe	l perfor	mance o	f compu	ting syster iency and					<b>PO</b> <sub>4</sub> ,	PO <sub>5</sub>
CO <sub>4</sub> PO <sub>1</sub> - Engineering problems, PO <sub>5</sub> - 1	improve needs to vulnerab g Knowledg	the sector be tran- ility in a e, <b>PO</b> <sub>2</sub> - P	urity and smitted comput roblem ar	l privacy over ne ing syste nalysis, <b>P</b>	v of data tworks a em. D3- Design	by reduce and reduce n/develop		nount of mber of tions, <b>PO</b> 4	data t points - Cond	hat of uct inv	estig	ations	
or team work, <b>PC</b>			PO <sub>11</sub> - Pro	ject mana	agement a	nd finance		long Learn	ing	,		-,	
Course													
Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	$PO_6$	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PC	<b>)</b> <sub>10</sub>	PO <sub>1</sub>	1 <b>PO</b> 12
CO <sub>1</sub>	3	2											
CO <sub>2</sub>		2	2										
CO <sub>3</sub>				2	2								
CO <sub>4</sub>				2					2	3	3		
			1 -	Reason	able; 2 –	Significar	ıt; 3 – Stro	ng					
<b>Detailed Conte</b> Unit: 1		Charac Compu	uction t steristics uting Par	to Edge s and Ko adigms	and F ey Bene	og Comp fits of Ec	outing, Ov lge and F	verview o og Comp	uting,	Com	paris	son w	ith Other
Unit: 2		Nodes	, Commu	inication	Protoco	ls and Ne	Hardware a twork Top	ologies					
Unit: 3	5	Autono	omous V	ehicles, l	Industry	4.0	, Internet	Ű	. ,				
Unit: 4		and Au	ithorizat	ion, Data	a Encryp	tion and I	Computing, Decryption	, Privacy-	prese	rving T	Tech	nique	5
Unit: 5		Models	s and Lai	nguages,	Testing	and Debu	e and Fog gging, Dep	loyment	and M	anagei	men	t, Case	Studies
Examination a exams/ assign: examination. Text Books:													
	Edge Cor	nputing:	Princip	les and	Paradign	ns" by Ra	jkumar Bu	yya, Satis	h Nar	ayana	Srir	ama,	and Ivona

2	Edge Computing for the Internet of Things" by Chi-Yu Li, Yan Zhang, and Laurence T. Yang.
Refe	erence Books:
1	Fog Computing: Concepts, Frameworks and Technologies" by Rupak Biswas and Yogesh Simmhan.
2	Mobile Cloud Computing: Models, Advances, and Applications" by F. Richard Yu, Victor Leung, and Long Hu.

	le				Course T					cture	-			
MTCS345PI	ET			-		ptimization L				T P	Seme	ster: III		
Version: 1.2	~ 1			of Appro	oval: 16th	n BoS 17-1		~ 1	4	0 0				
	Scheme of							Scheme				10.0		
	f Periods		Hrs.					m Score	:	100				
Periods	s/Week	: 4										30		
The set was at '	Credits	: 4	4							emester	:	70		
Instructio			ture						Exam L	Duration	:	3 Hrs.		
Prerequisite(s): M		earning												
Course Objectives					an af na	ما من مساط		_						
<ol> <li>To provide ins</li> <li>To understand</li> </ol>									A A A A A A A A A A A A A A A A A A A	nd quani	ng mode			
<ol> <li>To understand</li> <li>To optimize the</li> </ol>														
4. To introduce														
engineering m									u upo	in the i	undunie	intens 0		
Course Outcomes				und mu		ii or objet	, and a rain							
COs No.	<u>\</u>			S	tatemen	t				Mar	ped Pro	gram		
	cos no. Statement										tcomes (			
CO <sub>1</sub>	Understa	and appr	opriate	optimiza	tion me	thod to s	olve con	nplex pro	blems		<b>D</b> <sub>1</sub> , <b>PO</b> <sub>2</sub> ,	· /		
	involved		-	-				· ·						
<b>CO</b> <sub>2</sub>	Analyze	the appr	opriate	algorithr	n for all	ocation o	f resourd	ces to op	timize	PO	<b>D</b> <sub>3</sub> , <b>PO</b> <sub>4</sub> ,	PO <sub>5</sub>		
	the vario	us progr	amming	techniq	ues.			-						
CO <sub>3</sub>						orkings o		phical, si	mplex	PO	<b>D</b> <sub>4</sub> , <b>PO</b> <sub>6</sub> ,	PO <sub>9</sub>		
						ve decisio	n on							
	variables													
$CO_4$						of various				PO <sub>4</sub> , PO <sub>5</sub> , PO <sub>6</sub> , PO <sub>9</sub>				
						world pro				L .				
PO <sub>1</sub> - Engineering Kr														
problems, <b>PO</b> <sub>5</sub> - Mod										PO <sub>8</sub> - Ethi	cs, <b>PO</b> <sub>9</sub> -	Individua		
or team work, PO <sub>10</sub> -	Communic	cation, PC				mes with								
Course Outcomes	S PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	<b>PO</b> <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> 7	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO <sub>11</sub>	<b>PO</b> <sub>12</sub>		
	3	2	103	2	103	100	10/	108	109	1 0 10	101	1 0 12		
		_	2	1	2									
CO <sub>3</sub>	-			2		2			2					
		<u>2</u>							_					
CO4				U U	-	2			2					
CO <sub>4</sub>			1 – R	easonabl	e: 2 – Sia	-	3 – Stroi	na	2					
			1 – R	easonabl	e; 2 – Sig	 gnificant;	3 – Stroi	ng	2					
CO <sub>4</sub> Detailed Contents	5:	Introdu				jnificant;		0	1	zation –	Stateme	ent of ar		
Detailed Contents	5:		uction to	o Optimi	zation: E	<b>jnificant;</b> Engineerir	ng applic	ation of	Optimi					
	5:	Optimi	uction to zation p	o Optimi: problem	zation: E - Optim	jnificant;	ng applic em form	ation of ulation -	Optimiz Classi	fication	of Opti	mizatior		
Detailed Contents	s:	Optimi probler	uction to zation p m. Optir	o Optimi problem num des	zation: E - Optin ign cono	<b>gnificant;</b> Engineerin nal Proble	ng applic em form finition o	ation of ulation – of Global	Optimiz Classi and Lo	fication	of Opti	mizatior		
Detailed Contents	<u>s:</u>	Optimi probler criteria	uction to zation p m. Optir a - Revie	o Optimiz problem num des w of basi	zation: E - Optim ign cono c calculu	<b>gnificant;</b> Engineerin nal Proble cepts: De	ng applic em form finition o ts – Glob	ation of o ulation - of Global oal optima	Optimiz Classi and Lo ality	fication ocal opti	of Opti ma – Oj	mizatior ptimality		
<b>Detailed Contents</b> Unit: 1	<u>s:</u>	Optimi probler criteria Linear BigM r	action to zation p m. Optir a - Revie Program nethod,	O Optimiz problem num des w of basi nming: In Two-pha	zation: E - Optim ign cond c calculu troducti ase metl	Engineerin al Proble cepts: De us concep on and fc hod, Deg	ng applic em form finition o ts – Glob rmulatic eneracy,	ation of ulation - of Global oal optima on of mod non-exis	Optimiz Classi and Lo ality lels, Co stent a	fication ocal optim nvexity, S	of Opti ma – Oj Simplex unded s	mization ptimalit method olutions		
Detailed Contents	<u>s:</u>	Optimi problem criteria Linear BigM r revised	action to zation p m. Optir <u>a - Revie</u> Program nethod, l simple	o Optimi: problem num des <u>w of basi</u> ming: In Two-ph: ex metho	zation: E - Optim ign cono <u>c calculu</u> troducti ase metl od, dual	Engineerin al Proble cepts: De 15 concep on and fo	ng applic em form finition o ts – Glob rmulatic eneracy,	ation of ulation - of Global oal optima on of mod non-exis	Optimiz Classi and Lo ality lels, Co stent a	fication ocal optim nvexity, S	of Opti ma – Oj Simplex unded s	mization ptimalit method olutions		
<b>Detailed Contents</b> Unit: 1	<u></u>	Optimi proble criteria Linear BigM r revised transpo	action to zation p m. Optir a - Revie Program nethod, l simple portation	o Optimiz problem num des w of basi nming: In Two-pha ex metho and assig	zation: E - Optim ign conc <u>c calculu</u> troducti ase metl od, dual gnment	Engineerii hal Proble cepts: De us concep on and fo hod, Deg lity in L	ng applic em form finition o ts – Glob rmulatic eneracy,	ation of ulation - of Global oal optima on of mod non-exis	Optimiz Classi and Lo ality lels, Co stent a	fication ocal optim nvexity, S	of Opti ma – Oj Simplex unded s	mization ptimalit method olutions		
<b>Detailed Contents</b> Unit: 1	<u></u>	Optimi problem criteria Linear BigM r revised transpo problem	action to zation p m. Optir a - Revie Program nethod, l simple ortation ms, trave	o Optimis problem num des w of basi nming: In Two-pha ex metho and assig eling sale	zation: F - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr	mificant; Engineerin hal Proble cepts: De is concept on and fo hod, Deg lity in L	ng applic em form finition ( ts – Glob rmulatic eneracy, PP, dua	ation of ulation – of Global pal optima on of mod non-exis l simples	Optimiz Classi and La ality els, Co stent and c meth	fication ocal optim nvexity, S nd unbou od, sens	of Opti ma – Oj Simplex unded s sitivity	mization ptimalit method olutions analysis		
<b>Detailed Contents</b> Unit: 1 Unit: 2	5:	Optimi problem criteria Linear BigM r revised transpo problem Nonlin	action to zation p m. Optin <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog	o Optimis problem num des w of basi ming: In Two-pha ex metho and assig eling sale gramming	zation: F - Optim ign cono <u>c calculu</u> troducti ase metl od, dual gnment sman pr g: Introd	mificant; Engineerin al Proble cepts: De is concep on and fo hod, Deg lity in L oblem.	ng applic em form finition o ts – Glob rmulatic eneracy, PP, dua	ation of ulation - of Global oal optima on of mod non-exis l simples	Optimiz Classi and La ality els, Co stent and c meth	fication focal optim nvexity, S ad unbou od, sens ls, Classi	of Opti ma – Op Simplex unded s sitivity cal opti	mization ptimalit method olutions analysis mization		
<b>Detailed Contents</b> Unit: 1	<u>s:</u>	Optimi problem criteria Linear BigM r revised transpo problem Nonlin method	action to zation p m. Optir <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa	o Optimis problem num des w of basi ming: In Two-pha ex metho and assig eling sale gramming lity and	zation: E - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd	mificant; Engineerin al Proble cepts: De is concep on and fo hod, Deg lity in L oblem. luction an lity cons	ng applic em form finition o ts – Glob rmulatic eneracy, PP, dua nd formu traints,	ation of ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange	Optimiz Classi and La ality lels, Co stent ar c meth mode multi	fication pcal optim nvexity, S nd unbou nod, sens ls, Classi pliers an	of Opti ma – Op Simplex unded s sitivity cal opti d Kuhr	mization ptimalit method olutions analysis mization		
<b>Detailed Contents</b> Unit: 1 Unit: 2	<u>s:</u>	Optimi problem criteria Linear BigM r revised transpo problem Nonlin methoo conditi	action to zation p m. Optir <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa ons, qua	o Optimis problem num des w of basi ming: In Two-pha ex metho and assig eling sale gramming ility and idratic fo	zation: F - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd inequa rms, qua	Engineerin al Proble cepts: De us concep on and fo hod, Dege lity in L oblem. luction an lity cons adratic pr	ng applic em form finition o ts – Glob rrmulatio eneracy, PP, dua PP, dua nd formu traints, ogrammi	ation of ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble	Optimiz Classi and La ality els, Co stent an c meth multi em, Wo	fication pcal optin nvexity, s nd unbou nod, sens ls, Classi pliers an lfe's met	of Opti ma – Op Simplex unded s sitivity cal opti d Kuhr hod.	mization ptimalit method olutions analysis mization n-Tucke		
<b>Detailed Contents</b> Unit: 1 Unit: 2	<u>s:</u>	Optimi problem criteria Linear BigM r revised transpo problem Nonlin method conditi	action to zation p m. Optir <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa <u>ions, qua</u> ic Prog	o Optimis problem num des <u>w of basi</u> ming: In Two-pha ex metho and assig eling sale gramming ility and <u>idratic fo</u> ramming	zation: E - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd g: Introd inequa rms, qua g: Princi	Engineerin al Proble cepts: De us concept on and fo hod, Deg lity in L oblem. luction and lity cons adratic pr ple of o	ng applic em form finition o ts – Glot rmulatic eneracy, PP, dua phd formu traints, ogrammi ptimality	ation of ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble	Optimi: Classi and La ality lels, Co stent and content content multi em, Wo ive rela	fication pcal optim nvexity, s nd unbou nod, sens ls, Classi pliers an <u>lfe's met</u> ations, s	of Opti ma – Op Simplex Inded s sitivity cal opti d Kuhr hod. olution	mization ptimalit method olutions analysis mization a-Tucke of LPF		
<b>Detailed Contents</b> Unit: 1 Unit: 2	s:	Optimi problem criteria Linear BigM r revised transpo problem Nonlin method conditi Dynam Optimi	action to zation p m. Optir <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa ions, qua ic Prog zation a	o Optimi: problem num des w of basi ming: In Two-pha and assig eling sale gramming dratic fo ramming lgorithm	zation: E - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd inequa prms, qua g: Princi s for solv	Engineerin al Proble cepts: De is concep on and fo hod, Deg lity in L oblem. luction an lity cons adratic pr ple of o	ng applic em form finition o ts – Glot rmulatic eneracy, PP, dua nd formu traints, ogrammi ptimality crained o	ation of ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble r, recursi ptimizati	Optimiz Classi and La ality lels, Co stent and c meth multi em, Wo ive relation on prol	fication pcal optim nvexity, s nd unbou od, sens oliers an lfe's meti ations, s plems – c	of Opti ma – Op Simplex inded s sitivity cal opti id Kuhr hod. olution lirect m	mization ptimalit method olutions analysis mization a-Tucke of LPF ethods		
Detailed Contents Unit: 1 Unit: 2 Unit: 3	<u>s:</u>	Optimi problem criteria Linear BigM r revised transpo problem Nonlin method conditi Dynam Optimi penalty	action to zation p m. Optin a - Revie Program nethod, l simple ortation ms, trave ear Prog ds, equa ions, qua ic Prog zation a y functio	o Optimis problem num des w of basi ming: In Two-pha and assig eling sale gramming lity and dratic fo ramming lgorithm on meth	zation: E - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd sman pr g: Introd inequa rms, qua rms, qua s for solv ods - s	Engineerii hal Proble cepts: De us concep on and fo hod, Deg lity in L oblem . luction an lity cons adratic pr ple of o ving const steepest	ng applic em form finition ( ts – Glob rmulatic eneracy, PP, dual nd formu traints, ogrammi ptimality crained o descent	ation of ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble r, recursi ptimizati	Optimiz Classi and La ality lels, Co stent and c meth multi em, Wo ive relation on prol	fication pcal optim nvexity, s nd unbou od, sens oliers an lfe's meti ations, s plems – c	of Opti ma – Op Simplex inded s sitivity cal opti id Kuhr hod. olution lirect m	mization ptimalit method olutions analysis mization a-Tucke of LPF ethods		
Detailed Contents Unit: 1 Unit: 2 Unit: 3	<u></u>	Optimi problem criteria Linear BigM r revised transpo problem Nonlin methoo conditi Dynam Optimi penalty constra	action to zation p m. Optin <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa ic Prog zation a y function ained an	o Optimis problem num des w of basi nming: In Two-pha ex metho and assig eling sale gramming dity and dratic fo ramming lgorithms on metho d uncons	zation: E - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd sman pr g: Introd inequa rms, qua g: Princi s for solv ods – s strained	nificant; Engineerin hal Proble cepts: De is concept on and fo hod, Dege lity in L oblem . luction and lity const adratic pr ple of o ving const steepest algorithm	ng applic em form finition o ts – Gloh rmulatic eneracy, PP, dua nd formu traints, ogrammi ptimality crained o descent is.	ation of ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble r, recursi ptimizati method	Optimiz Classi and La ality els, Co stent and tent and te	fication pcal optim nvexity, s nd unbou od, sens od, sens ls, Classi pliers an lfe's met ations, s plems – c ineering	of Opti ma – Op Simplex inded s sitivity cal opti d Kuhr hod. olution lirect m applica	mization ptimalit method olutions analysis mization a-Tucke of LPF ethods tions o		
Detailed Contents Unit: 1 Unit: 2 Unit: 3	<u></u>	Optimi problem criteria Linear BigM r revised transpo problem Nonlin method conditi Dynam Optimi penalty constra Integen	action to zation p m. Optin <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa ic Prog zation a zation a function ained an c Linear	O Optimis problem num des w of basi ming: In Two-pha ex metha and assig eling sale gramming lity and idratic fo ramming gorithms on meth d uncons Progra	zation: E - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd inequa prms, qua prms, qua c s for solv ods - s strained mming:	nificant; Ingineerin al Proble cepts: De is concept on and for hod, Dege lity in L oblem. luction and lity const adratic pr ple of o ving const steepest algorithm Gomory	ng applic em form finition o ts – Glot rmulatic eneracy, PP, dual nd formu traints, ogrammi ptimality crained o descent s. 's cuttir	ation of c ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble c, recursi ptimizati method	Optimiz Classi and La ality els, Co stent and tent, Co stent and tent, Co tent and tent and t	fication pcal optim nvexity, s ad unbou od, sens ols, Classi pliers an lfe's met ations, s plems – c ineering	of Opti ma – Op Simplex unded s sitivity cal optic d Kuhr hod. olution lirect m applica	mization ptimalit method olutions analysis mization a-Tucke of LPF ethods tions o		
Detailed Contents Unit: 1 Unit: 2 Unit: 3	<u></u>	Optimi problem criteria Linear BigM r revised transpo problem Nonlin method conditi Dynam Optimi penalty constra Integen algorith	action to zation p m. Optin <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa ions, qua ic Prog zation a y function ained an c Linear hm, Kna	o Optimis problem num des w of basi ming: In Two-pha ex metha and assig eling sale gramming ility and idratic fo ramming lgorithms on meth d uncons Progra upsack p	zation: E - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd inequa orms, qua g: Princi s for solv ods – s strained mming: roblem,	nificant; Ingineerin al Proble cepts: De is concept on and for hod, Degen lity in L oblem. luction and lity const adratic pr ple of o ving const steepest algorithm Gomory linear	ng applic em form finition o ts – Glot rmulatic eneracy, PP, dual nd formu traints, ogrammi ptimality crained o descent is. cuttir 0-1	ation of o ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble r, recursi ptimizati method	Optimiz Classi and La ality els, Co stent and tent, Co stent and multi em, Wo ve relation on prol - Eng methon. N	fication pcal optin nvexity, S nd unbou nod, sens ls, Classi pliers an lfe's met ations, s plems – c ineering od, Bran Modern	of Opti ma – Op Simplex inded s sitivity cal opti d Kuhr hod. olution lirect m applica	mization method olutions analysis mization -Tucket of LPF ethods tions c		
Detailed Contents Unit: 1 Unit: 2 Unit: 3	5: 	Optimi problem criteria Linear BigM r revised transpo problem Nonlin method conditi Dynam Optimi penalty constra Integen algoriti Optimi	action to zation p m. Optin <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa ons, qua ic Prog zation a v functio ained an c Linear hm, Kna zation:	o Optimi: problem num des w of basi ming: In Two-ph: ex metho and assig eling sale gramming lity and dratic fo ramming logorithm fon meth d uncons Progra psack p Genetic	zation: F - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd rms, qua rms, qua g: Princi s for solv ods – s strained mming: roblem, Algorit	mificant; Ingineerin al Proble cepts: De is concept on and for hod, Degen lity in L oblem. luction and lity conse adratic pr ple of o ving consest algorithm Gomory linear thms -	ng applic em form finition o t <u>s - Glot</u> rmulatic eneracy, PP, dua nd formu traints, ogrammi ptimality trained o descent s. cuttir 0-1 Simulato	ation of o ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble grobles probles probles ed Annea	Optimiz Classi and La ality lels, Co stent and c metho multi em, Wo ive relation on prol - Eng metho n. M ling - A	fication pcal optim nvexity, S ad unbound od, sense od, sense life's met ations, s pliers an life's met ations, s plems – of ineering od, Bran fodern ant colon	of Opti ma – Op Simplex unded s sitivity cal opti d Kuhr hod. olution lirect m applica nch and metho y optim	mization method olutions analysis mization a-Tucke of LPF ethods tions of l bound ods o ization		
Detailed Contents Unit: 1 Unit: 2 Unit: 3 Unit: 4	s:	Optimi problem criteria Linear BigM r revised transpo problem Nonlin method conditi Dynam Optimi penalty constra Integen algorith Optimi Tabu s	action to zation p m. Optin <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa ons, qua ic Prog zation a v functio ained an c Linear hm, Kna zation: earch -	o Optimis problem num des w of basi ming: In Two-pha ex metho and assis eling sale gramming lity and idratic fo ramming lgorithm on meth d uncons • Progra upsack p Genetic Neural-	zation: E - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd rms, qua rms, qu	mificant; Ingineerin al Proble cepts: De is concept on and for hod, Degen lity in L oblem. luction and lity conse adratic pr ple of o ving consest algorithm Gomory linear thms - k based (	ng applic em form finition o ts – Glot rmulatic eneracy, PP, dual nd formu traints, ogrammi ptimality trained o descent s. C's cuttir 0-1 Simulato	ation of o ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble grobles probles ed Annea tion - Fu	Optimiz Classi and La ality lels, Co stent an c metho multi em, Wo ive rela on prol - Eng metho n. M ling - A izzy op	fication pcal optim nvexity, s ad unbound od, sense od, sense spliers an <u>lfe's met</u> ations, s plems – of ineering od, Bran fodern ant colon otimizatio	of Opti ma – Op Simplex inded s sitivity cal opti d Kuhr hod. olution lirect m applica nch and metho y optim on techn	mization ptimalit method olutions analysis mization a-Tucke of LPF ethods tions of l bound ods o ization niques		
Detailed Contents Unit: 1 Unit: 2 Unit: 3 Unit: 4	s:	Optimi problem criteria Linear BigM r revised transpo problem Nonlin method conditi Dynam Optimi penalty constra algorith Optimi Tabu s Applica	action to zation p m. Optin <u>a - Revie</u> Program nethod, l simple ortation ms, trave ear Prog ds, equa ons, qua ic Prog zation a y function ained an c Linear hm, Kna zation: search – ations. U	o Optimis problem num des <u>w of basi</u> ming: In Two-pha ex metho and assig eling sale gramming lity and <u>dratic fo</u> ramming lgorithms on meth <u>d uncons</u> Progra upsack p Genetic Neural- Jse of M	zation: E - Optim ign cond c calculu troducti ase metl od, dual gnment sman pr g: Introd rms, qua rms, qua g: Princi s for solv ods – s strained mming: roblem, Algorit Networl latlab to	mificant; Ingineerin al Proble cepts: De is concept on and for hod, Degen lity in L oblem. luction and lity conse adratic pr ple of o ving consest algorithm Gomory linear thms -	ng applic em form finition o ts – Glot rmulatic eneracy, PP, dua nd formu traints, ogrammi ptimality crained o descent s. cattin o-1 Simulato Dptimizati	ation of o ulation - of Global oal optima on of mod non-exis l simples ulation of Lagrange ing proble grobles probles ed Annea tion - Fu	Optimiz Classi and La ality lels, Co stent an c metho multi em, Wo ive rela on prol - Eng metho n. M ling - A izzy op	fication pcal optim nvexity, s ad unbound od, sense od, sense spliers an <u>lfe's met</u> ations, s plems – of ineering od, Bran fodern ant colon otimizatio	of Opti ma – Op Simplex inded s sitivity cal opti d Kuhr hod. olution lirect m applica nch and metho y optim on techn	mization ptimalit method olutions analysis mization a-Tucke of LPF ethods tions of l bound ods o ization niques		

Exan	nination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class sessional
exan	ns/assignments/quiz/seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
exan	nination.
Text	Books:
1	Kanti Swarup, Man Mohan and P.K.Gupta, Introduction to Operations Research, S.Chand & Co., 2006
2	J.C. Pant, Introduction to Operations Research, Jain Brothers, New Delhi, 2008
Refe	rence Books:
1	N.S.Kambo, Mathematical Programming Techniques, East-West Pub., Delhi, 1991.
2	Maurice Saseini, Arhur Yaspan, Lawrence Friedman, "Operations Research: Methods & Problems", 1st
	Edition, 1959.

Course C					Course '				Le	cture	_		
MTCS451	PET				oud Con				L	T P	Se	mester	:: IV
Version: 1.2	0.1	67. /		e of App	roval: 16	th BoS 17-			4	0 0			
Na		e of Instr					2	Scheme of			1.	100	
	of Periods ds/Week	: 60	Hrs.							m Score aluation	:	100 30	
Period	Credits	: 4						me		emester	•	30 70	
Instruct	ion Mode		ture							Duration	•	3 Hrs	
Prerequisite(s				Distribute	ed Syster	n				Juiation	·	51115	<u>.</u>
Course Object			in and i	<u>, 150115400</u>	eu bystei								
1. To presen 2. To unders	t a compre tand the d	ifferent t	ypes of o	cloud con	nputing	services 1	re and clou namely. ed cloud co				gy.		
4. To apply v								1 8	- <b>j</b>				
Course Outco		,											
COs No.			Statement Mapped Program Outcomes (POs)										
CO <sub>1</sub>			rchitecture, infrastructure and delivery models of cloud computing <b>PO1, PO2</b>										
$CO_2$	°		ud, data center, hypervisor, CPU, and memory management <b>PO<sub>2</sub>, PO<sub>3</sub>, PO<sub>4</sub>, PO<sub>5</sub></b> ,										
<b>70</b>	concerns		PO <sub>7</sub>										
<u>CO3</u>			e virtualization concept. PO <sub>3</sub> , PO <sub>5</sub> loud computing, virtualization, security, and privacy issues. PO <sub>4</sub> , PO <sub>5</sub> , PO <sub>8</sub>										
CO <sub>4</sub> PO <sub>1</sub> - Engineerin													
problems, <b>PO</b> <sub>5</sub> - or team work, <b>P</b>	Modern too	ol usage, <b>F</b>	<b>0</b> 6- The <b>PO</b> 11- Pro	engineer a oject mana	and socie igement a	ty, <b>PO</b> 7- Er and finance	vironment a , <b>PO</b> 12- Life-	and sustair long Learn	ability, ing				
		1	Mapp	oing of co	ourse ou	tcomes w	ith prograr	n outcom	es				
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PC	) <sub>11</sub> F	PO <sub>12</sub>
Outcomes			103	101	103	100	10/	108	103	1 010			012
<u>CO1</u>	2	2											
		2	2 2	1	2		1						
CO <sub>3</sub> CO <sub>4</sub>			2	1	2			1					
			1 -	-	-	Significan	nt; 3 – Stro	-					
Detailed Cont	ents'		1-	- Keusoni	<i>idie</i> , 2 –	Significu	11, 5 - 5110	ity					
Unit:		service Applica	es: Bene ations c	fits and	challen nputing	ges of cl , Busines	iew of Clo oud comp s models	uting, Ev	olution	n of Clo	ud C	omput	ing,
Unit:	2	Cluste Charac Cloud,	r Comp cteristic Private	uting, G s of Clo Cloud, H	rid Con ud Com Hybrid C	nputing, puting. (	Grid Com Cloud Moc mmunity ( ud.	lels: Ben	efits of	f Cloud	Mod	els, Pu	blic
Unit:	3	Platfor as a S	m as a ervice	Service – Comn	– Infras nunicati	structure	es of Clou as a Servio rvices. Se ce.	ce - Data	base a	s a Servi	ce- N	Ionito	ring
Unit: ·	4	Virtual Virtual Struct Machin Virtual Advano	ization: ization- ures -Ty ne soft ization- ce conc	Basics Limitat pes of V ware - Virtual epts in	of Vi ion of V ïrtualiza Virtual ization cloud c	irtualizati irtualizat ation – Vi lization Tools (VI omputing	ion – N ion-Appro rtual mach of CPU, Mware, Ci g : Data co , Hadoop I	oaches to line - Typ Memory trix, Mic enter for	Virtua oes of v , I/O rosoft, cloud	alization virtual M Device Oracle	-Virt lachii s - virtu	tualizat ne- Vir Resou tal Boy	tion tual ırce <) –
Unit:	5	Securi Identif solutic Refere	ty in th ied clou ns, Inte nce Are ty Archi	e Clouc d securi egrated chitectur	l: Secur ty Issue Solutior re –Ide	ity Over s-Catego ns: Amaz ntity and	view – Clarization of on as Cas d Access ecurity – A	oud Secu cloud se se study Manager	urity C curity - Clou nent S	issues– Id comp Security	State outing Moi	of the g Secu hitoring	Art rity g –

Examination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class sessional

exam	ns/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
exam	nination.
Text	Books:
1	Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
2	John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC
	Press, 2010.
Refe	rence Books:
1	Cloud Computing" A Practical Approach" Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGraw-Hill.
2	Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the
	Internet of Things", Morgan Kaufmann Publishers, 2012

Course Coo	de					Course T				Le	cture			
MTCS452P	ET						echnolo			L	Т	Р	Seme	ster: IV
Version: 1.2					of Appro	oval: 16th	n BoS 17-1			4	0	0		
N.7.	Scheme	of In							Scheme					10.0
	f Periods	:	60 1	Hrs.						<u>laximu</u>			:	100
Period	s/ Week Credits	:	4 4						Inte	rnal Ev End S			:	30 70
Instructi		•		ture						Exam I			•	3 Hrs.
Prerequisite(s): C										2.1.4.111 2	, ai atre			0 11101
Course Objective														
<ol> <li>To gain an o regarding wir</li> <li>To introduce</li> </ol>	eless acce	ess to	) Inte	ernet		C								•
<ul><li>multipoint, m</li><li>3. To provide at WMAN, WWA</li><li>4. To get and in</li></ul>	n overvie N. Netwo sight of V	w of rk se ⁄irele	Sta rvic ess r	ndards f es. Wire networki	less acce ng secui	ess netwo	orks plani	ning, des	ign and ir	nstallat	ion.			
software requ		link	qua	lity cont	rol.									
Course Outcomes	s (CO):										-	-		
COs No.					St	tatemen	t						ped Pro comes (	
CO <sub>1</sub>	Underst	and h	asic	terms a	nd chara	octeristic	es of wire	less acce	ss netwo	rks			PO <sub>1</sub> , PO	
								icss acce	SS IICtwo	1 K3.				
CO <sub>3</sub>		alyze various wireless access technologiesPO2, PO4, PO6alyze measurements of wireless access network parameter.PO3, PO4, PO5												
CO4	l l						s networ				PC		PO <sub>5</sub> , PO <sub>1</sub>	
PO <sub>1</sub> - Engineering Ki									tions, <b>PO</b> 4	- Condu				
problems, <b>PO</b> <sub>5</sub> - Moo or team work, <b>PO</b> <sub>10</sub> -	dern tool u	sage,	PO <sub>6</sub> -	- The eng m- Projec	ineer and t manage	l society, ment and	PO7- Envi	ronment a <b>O</b> 12- Life-l	ind sustair long Learn	nability, ing				
Course Outcomes	S PO <sub>1</sub>	PC		PO <sub>3</sub>	<b>PO</b> <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	PO <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>1</sub>	0	<b>PO</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>
	2			100	101	2	100					.0	1011	1 0 12
CO <sub>2</sub>		2	2		2		2							
CO <sub>3</sub>				2	3	3								
CO <sub>4</sub>					2	2					2			2
				1 – R	easonabl	e; 2 – Sig	nificant;	3 - Stroi	ig					
<b>Detailed</b> Content	s:	-												
Unit: 1		net Na	wor rrow	band ar	dvantage 1d broad	es and lband ne	erminals disadvan etworks, f ne Netwo	ixed and	verview o l nomadi	c netw		cces	s tech	
Unit: 2		for	free	quency	bands al	location	tworks, fr , Networ t- to- mu	k topolo	gies, hot	spot ne	etwork	cs. (	Commu	nication
Unit: 3		DE WN for Mu	CT, MAN broa Iltipo	IrDA), (802.16, adband pint Dist	UWB WiMAX, wireless tribution	(Ultra-V HIPERM access, I Service	used wir Wideband IAN, HIP Local Mul (MMDS) y and ban	), WLA ERACCES tipoint D . Ad -Ho	N (802.) SS), WWA Distributio	11, Wi AN (802 on Serv	-Fi, 1 2.20), 0 ice (LN	HIP Oth MDS	ERLAN, er tech 8), Mult	IrDA), nologies ichannel
Unit: 4		Win and cov sta	reles 1 tec veraş tion	ss access chnical a ge, link o or acce	s networ spects, ' capacity, ess poin	ks planr Technica networ t allocat	hing, desi al and Eco k comple ion. Base ss access	gn and in onomical xity and e station	factors f carrier-t and acc	for net co-inter ess po	work p ferenc int eq	olan ce r uipi	ning: e: atio (C, ment. 1	xpenses, /I). Base Ferminal
Unit: 5		Exa inte req ma pro	ampl erfao juire rket ovide	le of lap ce equip ements, researd ers (WD	top or h oment. V link qua ch and ASP) and	andheld Vireless lity con marketii l their r	PC wirel access n trol. Busing, service role on principal	ess conr etwork iness mo ce provi ublic tele	nection ir exploitati odel, wire ders, wir ecommur	n real e on and eless n reless nication	enviror 1 mana etworl data a 1 servi	nme age: k se appl ces	ent. PC ment, s ervices lication marke	wireless software market, service t, billing

	standards of wireless
	communication.
Exan	nination and Evaluation Pattern: It include both internal evaluation (30 marks) comprising two class sessional
exam	ns/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
exam	nination.
Text	Books:
1	M. P. Clark, Wireless Access Networks: Fixed Wireless Access and WLL networks Design and Operation, John
	Wiley & Sons, Chichester
2	D. H. Morais, Fixed Broadband Wireless Communications: Principles and Practical Applications, Prentice Hall,
	Upper Saddle River
Refe	rence Books:
1	R. Pandya, Introduction to WLLs: Application and Deployment for Fixed and Broadband Services, IEEE
	Press, Piscataway.

Course Co	ode				Course 7	Гitle			Le	cture			
MTCS453I	PET			0		r Big Data		L T P Se					
Version: 1.2				e of Appr	r <b>oval:</b> 16t	h BoS 17-			4	0 0			
	Scheme	1 I					S	cheme of			1		
	f Periods		Hrs.							m Score	:	100	
Period	s/Week	: 4						Inte		aluation	:	30	
In atom of	Credits	: 4	4					1		emester	:	70 3 Hrs.	
Instruction Prerequisite(s):													
Course Objectiv		menige	lice										
1. Understand		enges ar	nd oppor	tunities	of big da	ta proces	sing and ar	alvsis					
2. Learn the f													
3. Learn com													
4. Understand	l the priva	icy and s	ecurity o	challenge	es in big	data and t	their mitiga	ation tech	iniques				
Course Outcom	nes (CO):												
COs No.					Statem					0		Program nes (POs)	
CO <sub>1</sub>	•		assess the requirements and challenges of big data processing and identify appropriate algorithmic solutions.										
CO <sub>2</sub>			and apply distributed computing and parallel algorithms, such as to handle large-scale data processing and analysis.										
CO <sub>3</sub>	Apply da	ita mini	nining and machine learning techniques to analyze and extract PO <sub>4</sub> , PO <sub>5</sub>										
			shts from large-scale datasets, and understand their strengths and										
CO <sub>4</sub>	limitation		privoou	and a	oourity	aballange	es in big	data an	d ann	ly D	<u>а</u> р	<b>O</b> <sub>9</sub> , <b>PO</b> <sub>10</sub>	
04	appropri					chanenge	ts in big	uata, al	iu app	Iy F	J4, F	<b>U</b> 9, <b>FU</b> 10	
PO1- Engineering						/developr	nent of solu	tions, <b>PO</b> 4-	· Condu	ct investi	gation	s of complex	
problems, PO5- N	lodern too	l usage, <b>P</b>	O <sub>6</sub> - The e	engineer a	and societ	y, <b>PO</b> 7- En	vironment a	nd sustain	ability,				
or team work, <b>PO</b>	10- Commu	nication,											
			Марр	ing of co	ourse out	comes wi	ith progran	n outcom	es		1		
Course Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	РС	P11 PO <sub>12</sub>	
CO <sub>1</sub>	3	2											
	0	2	2										
CO <sub>3</sub>				2	2								
CO <sub>4</sub>				2					2	3			
			1 -	Reasona	ıble; 2 – S	Significan	it; 3 – Stror	ıg			•		
<b>Detailed</b> Conte	nts:	-											
												ts sources;	
Unit: 1										and val	ue; A	Algorithmic	
							lerance, an			a and i	ta pr	ogramming	
												File System	
Unit: 2													
		(GFS), and others; MapReduce implementations: Hadoop MapReduce, Apache Spark, and others; MapReduce algorithms: word count, inverted index, PageRank, and others											
		others	; маркес	Data Mining and Machine Learning for Big Data: Overview of data mining and machine									
		Data N	lining a	nd Mach	nine Lea	rning for	nt, inverteo Big Data:	l index, P Overviev	ageRar v of da	ata minii	ng an		
		Data M learnin	/lining an g techn	nd Mach iques; S	nine Lea: upervise	rning for d learnin	nt, inverteo Big Data: g: linear 1	l index, P Overviev regression	ageRar v of da n, logis	ata minii stic regr	ng an essio	n, decision	
Unit: 3		Data M learnin trees, a	Aining an g techn and rand	nd Mach iques; S om fore	nine Lea upervise sts; Unsi	rning for d learnin upervised	nt, inverted Big Data: g: linear 1 learning: d	<u>l index, P</u> Overviev regression clustering	ageRar v of da n, logis g, dime	ata minin stic regr nsionalit	ng an essio y red	n, decision uction, and	
Unit: 3		Data M learnin trees, a associa	Aining an g techn and rand ation rul	nd Mach iques; S om fore e mining	nine Lear upervise sts; Unsu g; Deep	rning for d learnin upervised learning:	nt, inverted Big Data: Ig: linear n learning: d convolutio	<u>l index, P</u> Overviev regression clustering	ageRar v of da n, logis g, dime	ata minin stic regr nsionalit	ng an essio y red	n, decision	
Unit: 3		Data M learnin trees, a associa networ	Aining an og techn and rand ation rul rks, and o	nd Mach iques; S om fore e mining leep reir	nine Lea upervise sts; Unsu g; Deep nforceme	rning for d learnin upervised learning: ent learnii	nt, inverted Big Data: g: linear 1 learning: d convolutiong	l index, P Overviev regression clustering onal neur	ageRar v of da n, logis g, dime ral net	ata minin stic regr nsionalit works, r	ng an ession y red recurr	n, decision uction, and rent neural	
Unit: 3		Data M learnin trees, a associa networ Stream	Aining an og techn and rand ation rul rks, and o ning Algo	nd Mach iques; S om fore e mining leep reir rithms a	nine Lea upervise sts; Unsu g; Deep nforceme and Skete	rning for d learnin upervised learning: ent learnin ching Tec	nt, inverted Big Data: g: linear n learning: d convolutiong hniques: In	l index, P Overviev regression clustering onal neur	ageRar v of da n, logis g, dime ral net	ata minin stic regr nsionalit works, r treaming	ng an ession y red recurr g algo	n, decision uction, and rent neural rithms and	
		Data M learnin trees, a associa netwoi Stream sketch	Aining an g techn and rand ation rul rks, and o ning Algo ing techn	nd Mach iques; S om fore e mining leep reir rithms a niques; S	nine Lea upervise sts; Unsu g; Deep nforceme nd Sketo sketching	rning for d learnin upervised learning: ent learnin ching Tec g algorith	nt, inverted Big Data: Ig: linear i learning: d convolutiong chniques: In ms: Count-	<u>l index, P</u> Overviev regression clustering onal neur ntroductio -Min Sket	ageRan v of da n, logis g, dime ral net on to s cch, Blo	ata minin stic regr nsionalit works, r treaming oom Filte	ng an ession y red recurr g algo er, Hy	n, decision uction, and ent neural rithms and perLogLog,	
Unit: 3 Unit: 4		Data M learnin trees, a associa networ Stream sketch and ot	Aining an and rand ation rul tks, and o hing Algo ing techn hers; Stro	nd Mach iques; S om fore e mining <u>leep reir</u> rithms a niques; S eaming a	ine Lea upervise sts; Unsu g; Deep nforceme nd Sketo ketching lgorithm	rning for d learnin upervised learning: ent learnin ching Tec g algorith ns: freques	nt, inverted Big Data: g: linear n learning: o convolutiong chniques: In ms: Count- ncy estima	<u>l index, P</u> Overviev regression clustering onal neur htroductio -Min Sket tion, heav	ageRar v of da n, logis g, dime ral net on to s tch, Blo	ata minin stic regr nsionalit works, r treaming oom Filte rs detect	ng an ession y red ecurr g algo er, Hy cion, a	n, decision uction, and rent neural rithms and	
		Data M learnin trees, a associa networ Stream sketch and oth elemen recom	Aining an and rand ation rul rks, and c aing Algo ing techn hers; Stro at estin mendatio	nd Mach iques; S om fore e mining deep reir rithms a niques; S eaming a nation; on syster	ine Lea upervise sts; Unsu g; Deep nforceme nd Sketching lgorithm Applica ns, and f	rning for d learnin upervised learning: ent learnin ching Tec g algorith ns: frequentions of raud dete	nt, inverted Big Data: g: linear n learning: d convolutiong hniques: In ms: Count- ncy estima streamin ction	<u>l index, P</u> Overview regression clustering onal neu ntroductie -Min Sket tion, heav ng algon	ageRar v of da n, logis g, dime ral net on to s cch, Blo vy hitte ithms:	ata minin stic regr nsionalit works, r treaming bom Filte rs detect netwo	ng an ession y red ecurr g algo r, Hy ion, a rk 1	n, decision uction, and ent neural rithms and perLogLog, und distinct nonitoring,	
		Data M learnin trees, a associa networ Stream sketch and oth elemer recomm Privacy	Aining an and rand ation rul rks, and o hing Algo ing techn hers; Stro at estin mendatio 7 and Sec	nd Mach iques; S om fore e mining leep reir rithms a niques; S eaming a nation; on syster curity in	ine Lea upervise sts; Unsu g; Deep nforceme nd Sketo ketching lgorithm Applica ns, and f Big Data	rning for d learnin upervised learning: ent learnin ching Tec g algorith as: freque tions of <u>raud dete</u> :: Introdu	nt, inverted Big Data: Ig: linear n learning: o convolutiong chniques: In ms: Count- ncy estima streamin ction ction to pr	l index, P Overview regression clustering onal neue ntroductio -Min Sket tion, heav ng algon	ageRar v of da n, logis g, dime ral net on to s cch, Blo vy hitte "ithms: securi	ata minin stic regr nsionalit works, r treaming oom Filte rs detect netwo ty challe	ng an ession y red ecurr g algo r, Hy tion, a rk 1 nges	n, decision uction, and ent neural rithms and perLogLog, nd distinct nonitoring, in big data;	
Unit: 4		Data M learnin trees, a associa netwoi Stream sketch and oth elemen recomm Privacy Privacy	Aining an and rand and rand ation rul ks, and a ing Algo ing techn hers; Stra nt estim mendatio 7 and Sec 7-preserv	nd Mach iques; S om fore e mining leep reir rithms a niques; S eaming a nation; on syster curity in ving tecl	ine Lea upervise sts; Unsu g; Deep nforceme nd Sketo ketching lgorithm Applica ns, and f Big Data hniques:	rning for d learnin upervised learning: ent learnin ching Tec g algorith is: freque: tions of raud dete :: Introdu different	nt, inverted Big Data: Ig: linear n learning: o convolution g chniques: In ms: Count- ncy estima streamin ction ction to pr ial privacy	l index, P Overview regression clustering onal neur htroductio -Min Sket tion, heav ng algon ivacy and , homom	ageRar v of da n, logis g, dime ral net on to s cch, Blo vy hitte rithms: securi orphic	ata minin stic regr nsionalit works, r treaming oom Filte rs detect netwo ty challe encrypt	ng an ession y red ecurr g algo r, Hy ion, a rk 1 nges ion, a	n, decision uction, and ent neural rithms and perLogLog, und distinct nonitoring, in big data; and secure	
		Data M learnin trees, a associa netwo Stream sketch and otl elemen recom Privacy multip	Aining an and rand and rand ation rul ks, and a ing Algo ing techn hers; Stra hers; Stra mendation and Sec and Sec preservanty con	nd Mach iques; S om fore e mining deep rein rithms a niques; S eaming a nation; on system curity in ving tech nputatio	ine Lea upervise sts; Unsu g; Deep ind Sketo ketching lgorithm Applica ns, and f Big Data hniques: n; Secu	rning for d learnin upervised learning: ent learnin ching Tec g algorith is: freque tions of raud dete i: Introdu- different rity threa	nt, inverted Big Data: Ig: linear n learning: o convolution g chniques: In ms: Count- ncy estima streamin ction ction to pr ial privacy ats: data b	d index, P Overview regression clustering onal neur htroductio -Min Sket tion, heav ng algon ivacy and r, homom preaches,	ageRar v of da n, logis g, dime ral net on to s cch, Blo ry hitte rithms: securi orphic cyber	ata minin stic regr nsionalit works, r treaming oom Filte rs detect netwo ty challe encrypt attacks	ng an ession y red ecurr g algo r, Hy ion, a rk 1 nges ion, a	n, decision uction, and ent neural rithms and perLogLog, nd distinct nonitoring, in big data;	
Unit: 4		Data M learnin trees, a associa networ Stream sketch and otl elemer recom Privacy multip insider	Aining an g techn and rand and rand tion rul tks, and c ing Algo ing techn hers; Stro- nt estin mendation y and Second y and Second arty con- s; Securi	nd Mach iques; S om fore e mining deep reir rithms a niques; S eaming a nation; on syster curity in ving tecl nputatio ty measu	ine Lea upervise sts; Unsu g; Deep ind Sketo ketching lgorithm Applica ns, and f Big Data hniques: n; Secur ures: acc	rning for d learnin upervised learning: ent learnin ching Tec g algorith as: freque: tions of raud dete a: Introdu- different rity threa ess contr	nt, inverted Big Data: Ig: linear n learning: o convolution g chniques: In ms: Count- ncy estima ction ction to pr ial privacy ats: data b ol, authent	d index, P Overview regression clustering onal neur ntroductio -Min Sket tion, heav ng algon ivacy and , homom preaches, ication, an	ageRar v of da n, logis g, dime ral net on to s tch, Blo ry hitte securi orphic cyber nd audi	ata minin stic regr nsionalit works, r treaming oom Filte rs detect netwo ty challe encrypt attacks iting	ng an ession y red ecurr g algo r, Hy cion, a rk 1 nges ion, a	n, decision uction, and ent neural rithms and perLogLog, and distinct nonitoring, in big data; and secure malicious	

exan	ns/assignments/quiz/seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
exan	nination.
Text	Books:
1	Mining of Massive Datasets" by Jure Leskovec, Anand Rajaraman, and Jeff Ullman.
2	Data-Intensive Text Processing with MapReduce" by Jimmy Lin and Chris Dyer
Refe	rence Books:
1	Big Data: Principles and Paradigms" edited by Rajkumar Buyya, James Broberg, and Andrzej Goscinski
2	Scalable Machine Learning for Big Data" by Bijan Parsia and Yevgeny Kazakov.

	de				Course 7	ſitle			Leo	ture		
MTCS454P	ET			Advance	d Compu	ıter Grapł	nics		L	ΤI	P Sem	ester: IV
Version: 1.2				e of Appr	r <b>oval:</b> 16t	h BoS 17-			4		)	
	Scheme						S	cheme o	f Exam	ination	l <u> </u>	
	Periods	: 60	Hrs.						laximui			100
Periods	/ Week	: 4						Inter	rnal Eva			30
	Credits	: 4								emeste		70
Instructio			cture					]	Exam D	uration	n :	3 Hrs.
Prerequisite(s):		cture & A	Algorithr	ns								
Course Objectiv					4	1		1	~			
<ol> <li>To understand</li> <li>To acquire the</li> <li>To analysis the</li> </ol>	ne knowle	edge of d	lrawing a	lgorithr	ns and te	chniques						
<b>4.</b> To apply 3-E				0	0	15.						
Course Outcome	8	epiesen		neepts.								
COs No.	<i>co</i> .				Stateme	nt				M	apped Pr	ooram
CO3 NO.				•	stateme	iit.						
	Understa techniqu		Outcomes (POs)       the various graphics systems and the output primitive       PO1, PO2									
CO <sub>2</sub>		rate the	te the different 2D Geometric transformations and viewing <b>PO</b> <sub>3</sub>									
			e Structure and Modeling concepts <b>PO</b> <sub>3</sub> , <b>PO</b> <sub>4</sub>									
CO <sub>4</sub>	Apply the	e 3D tran	nsformat	ions and	surface	detection	methods			İ	PO <sub>3</sub> , P	<b>O</b> 9
PO1- Engineering											tigations	of complex
problems, <b>PO</b> <sub>5</sub> - Mo										PO <sub>8</sub> - Et	hics, <b>PO</b> 9 <sup>-</sup>	- Individual
or team work, PO <sub>10</sub>	- Commu	nication, I										
Course			маррі	ng oi co	urse out	comes wi	th progran	outcom	es	r	1	
Outcomes	PO <sub>1</sub>	<b>PO</b> <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>10</sub>	PO <sub>11</sub>	<b>PO</b> <sub>12</sub>
	2	2	0									_
$CO_2$												
			2	2								
CO <sub>3</sub>			2	2					1			
			2 2		ible: 2 - 6	lianifican	t: 2 - Stron		1			
CO <sub>3</sub> CO <sub>4</sub>	ts		2 2		ıble; 2 – S	Significan	t; 3 – Stron	ıg	1			
CO <sub>3</sub>	ts:	Overvi	2 2 1-	Reasona						n syste	ms. Ran	dom-scan
CO <sub>3</sub> CO <sub>4</sub>	ts:	system softwa	2 2 <b>1 –</b> ew of Gi , graphic re. Outp	<b>Reasona</b> <b>aphics</b> es moni ut primi	<b>Systems</b> tors and tives: Lin	– Video o worksta ne drawir	display dev tions. Inp ng algorith	rices, rast ut device ms, Circle	ter-sca es, Har e gener	dcopy ration a	devices, algorithr	Graphics ns, ellipse
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	ts:	system softwar genera	2 2 <b>1 –</b> ew of Gi , graphic re. Outp	Reasona raphics f es moni ut primi prithms,	<b>Systems</b> tors and tives: Lin pixel ado	– Video o worksta ne drawir	display dev tions. Inp	rices, rast ut device ms, Circle	ter-sca es, Har e gener	dcopy ration a	devices, algorithr	Graphics ns, ellipse
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	ts:	system softwar genera and cha	2 2 <b>ew of Gi</b> , graphic re. Outp ting algo aracter g	Reasona raphics cs moni ut primi orithms, generatio	Systems tors and tives: Lin pixel ado ons.	– Video o worksta ne drawir dressing,	display dev tions. Inp ng algorith	ices, rast ut device ms, Circle primitive	ter-sca es, Har e gener es, Fill a	dcopy ration a area fu	devices, algorithr nctions,	Graphics ns, ellipse cell array
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1	ts:	system softwar genera and cha <b>Attribu</b> Area fi	2 2 1 – ew of Gi , graphic re. Outp ting algo aracter g ites of o Il attribu	Reasona aphics s cs moni ut primi orithms, ceneration utput pr utes, ch	Systems tors and tives: Lin pixel ado ons. <b>imitives</b> aracter	- Video o worksta ne drawir dressing, : Line att attributes	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun	ices, rast ut device ms, Circle primitive rve attrib dled attr	ter-sca es, Har e gener es, Fill a outes co ibutes	dcopy ration a area fu blor and Enquir	devices, algorithr nctions, d Gray-s ry functi	Graphics ns, ellipse cell array cale level, ons. <b>Two</b>
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten	ts:	system softwar genera and cha Attribu Area fi dimens	2 2 1 – ew of Gr , graphic re. Outp ting algo aracter g ites of o ill attribu sional (	Reasona caphics s cs moni ut primi orithms, ceneration utput pr utes, ch Geometr	Systems tors and tives: Lin pixel ado ons. <b>-imitives</b> aracter <b>ic tran</b>	- Video o worksta ne drawir dressing, :: Line att attributes sformatic	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun <b>ons:</b> Bas	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans	ter-sca es, Har e gener es, Fill s outes co ibutes format	dcopy ration a area fu blor and Enquir ions, l	devices, algorithr nctions, d Gray-s y functi Homoge	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co-
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1	ts:	system softwar genera and cha Attribu Area fi dimens ordinat	2 2 1 – ew of Gra , graphio re. Outp ting algo aracter g ites of o ll attribu sional ( tes, aff	Reasona raphics cs moni ut primi prithms, generation utput pri utes, ch Geometr ine tra	Systems tors and tives: Lin pixel ado ons. <b>-imitives</b> aracter <b>ic tran</b>	- Video o worksta ne drawir dressing, :: Line att attributes sformatic	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans	ter-sca es, Har e gener es, Fill s outes co ibutes format	dcopy ration a area fu blor and Enquir ions, l	devices, algorithr nctions, d Gray-s y functi Homoge	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co-
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1	ts:	system softwar genera and cha Attribu Area fi dimens ordinat transfo	2 2 1 – ew of Gra , graphic re. Outp ting algo aracter g ites of o ll attribu sional ( tes, aff	Reasona raphics for the second out primition of the second prithms, second the second output print of the second the seco	Systems tors and tives: Lin pixel ado ons. <b>:imitives</b> aracter <b>ic tran</b> nsforma	- Video ( worksta ne drawir dressing, : Line att. attributes <b>sformatic</b> tions, tr	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun o <b>ns:</b> Bas ransformat	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fune	er-sca es, Har e gener es, Fill s outes co ibutes format ctions.	dcopy ration a area fu olor and Enquir ions, I Raste	devices, algorithr nctions, d Gray-s d Gray-s y functi Homoge er met	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2	ts:	system softwar genera and cha Attribu Area fi dimens ordinat transfo <b>Two di</b>	2 2 <b>ew of Gi</b> , graphie re. Outp ting algo aracter g <b>ites of o</b> Il attribu <b>sional (</b> tes, aff prmation: <b>mensior</b>	Reasona raphics cs moni ut primi prithms, generatio utput pr ites, ch Geometr ine tra s. al view	Systems tors and tives: Lin pixel ad- ons. <b>:imitives</b> aracter <b>:ic tran</b> nsforma <b>ing:</b> View	- Video ( worksta ne drawir dressing, Line att attributes <b>sformatic</b> tions, tr	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun ons: Bas ransformat ine, viewin	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fun g transfo	er-sca es, Har e gener es, Fill a outes co ibutes format ctions. rmatio	dcopy ration a area fu blor and Enquir ions, 1 Raste	devices, algorithm nctions, d Gray-s y functi Homoge er met ing func	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1	ts:	system softwar genera and cha Attribu Area fi dimens ordinat transfo <b>Two di</b> clippin	2 2 1 – ew of Gr , graphia re. Outp ting algo aracter g ites of o ll attribu sional ( tes, aff prmation mension g – Co	Reasona raphics s cs moni ut primi orithms, generatio utput pr utes, ch Geometr ine tra s. al viewi ohen S	Systems tors and tives: Lin pixel ado ons. <b>:imitives</b> aracter ic tran nsforma ing: View utherlan	- Video ( worksta ne drawir dressing, Line att attributes <b>sformatic</b> tions, tr ving pipel d line (	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun ons: Bas ransformat ine, viewin clipping, J	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fun g transfo Liang Ba	er-sca es, Har e gener es, Fill a outes co ibutes format ctions. rrmatio arsky	dcopy ration a area fu blor and Enquir ions, 1 Raste n, view line c	devices, algorithr nctions, d Gray-s y functi Homoge er met ing func lipping.	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2	ts:	system softwan genera and cha Attribu Area fi dimens ordinat transfo <b>Two di</b> clippin clippin	2 2 1 – ew of Gi , graphie re. Outp ting algo aracter g ites of o ll attribu sional ( tes, aff mension g – Co g:Suther	Reasona raphics s cs moni ut primi orithms, ceneratio utput pr utes, ch Geometr ine tra s. al view ohen S land-Ho	Systems tors and tives: Lin pixel ado ons. <b>:imitives</b> aracter <b>ic tran</b> nsforma <b>ing:</b> View utherlan odgman p	- Video o worksta ne drawir dressing, Line att attributes sformatio tions, tr ving pipel d line o polygon cl	display dev tions. Inp ng algorith Filled area ributes, cu and Bun ons: Bas ransformat ine, viewin clipping, Wil	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fun- g transfo Liang Ba er Athert	er-sca es, Har e gener es, Fill a outes co ibutes format ctions. ormatio arsky con poly	dcopy ration a area fu blor and Enquir ions, 1 Raste n, view line c ygon cli	devices, algorithr nctions, d Gray-s y functi Homoge er met ing func lipping.	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon,
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2 Unit: 3	ts:	system softwan genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin Struct	2 2 1 – ew of Gi , graphie re. Outp ting algo aracter g ites of o ill attribu sional ( tes, affi rmation g – Co g:Suther ures an	Reasona caphics for cs moni- ut primi- prithms, ceneration utput pr- utes, ch Geometro ates, ch Geometro ine trans- bal viewi- phen S land-Ho d Hiera	Systems tors and tives: Lin pixel ado ons. <b>:imitives</b> aracter <b>ic tran</b> nsforma <b>ing:</b> View utherlan odgman p orchical	- Video o worksta ne drawir dressing, :: Line att attributes sformatic tions, tr ving pipel d line o polygon cl Modeling	display dev tions. Inp ng algorith Filled area ributes, cu a, and Bun ons: Bas ransformat ine, viewin clipping, Mil g: Structu	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fune g transfo Liang Ba er Athert re conce	er-sca es, Har e gener es, Fill a outes co ibutes format ctions. rrmatio arsky con poly	dcopy ration a area fu blor and Enquir ions, 1 Raste n, view line c ygon cli diting	devices, algorithr nctions, d Gray-s y functi Homoge er met ing func lipping. structu	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2	ts:	system softwan genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin Structu modeli	2 2 1 – ew of Gi , graphie re. Outp ting algo aracter g ites of o ill attribu sional ( tes, affi ormation g – Co g:Suther ures an ng conce	Reasona aphics for a primi orithms, ceneration ates, ch deometra a ch b cometra a ch cometra a ch cometra ch ch ch ch ch ch ch ch ch ch	Systems tors and tives: Lin pixel ado ons. <b>:imitives</b> aracter <b>ic tran</b> nsforma <b>ing:</b> View utherlan odgman p prchical erarchica	- Video o worksta ne drawir dressing, :: Line att attributes sformatic tions, tr ving pipel d line o polygon cl Modeling l modelir	display dev tions. Inp ng algorith Filled area ributes, cu a, and Bun ons: Bas ransformat ine, viewin clipping, Mil g: Structu ng with str	rices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fune g transfo Liang Ba er Athert re conce uctures.	er-sca es, Har e gener es, Fill a outes co ibutes format ctions. rrmatio arsky con poly epts, e Grapl	deopy ration a area fu olor and Enquir ions, 1 Raste n, view line c <u>ygon cl</u> diting nical us	devices, algorithr nctions, d Gray-s y functi- domoge er meti- ing func lipping. structur ser inter	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic faces and
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2 Unit: 3	ts:	system softwan genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin Structu modeli Interac	2 2 1 – ew of Gr , graphic re. Outp ting algo aracter g ites of o ll attribu sional ( tes, aff ormation g – Co g:Suther ures an ng conce ctive inp	Reasona aphics for cs moni- ut primi- prithms, ceneration utput pri- utes, ch Geometri- ine trans- conten S land-Hoc d Hiera epts, hie- ut meth	Systems tors and tives: Lin pixel ad- ons. <b>:imitives</b> aracter <b>:ic tran</b> nsforma <b>ing:</b> View utherlan odgman p prehical erarchica tods: The	- Video d worksta ne drawir dressing, : Line att. attributes sformatic tions, tr ving pipel d line bolygon cl Modeling al modelir e user Dia	display dev tions. Inp ng algorith Filled area ributes, cu a, and Bun ons: Bas ransformat ine, viewin clipping, Mil g: Structu	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fune g transfo Liang Ba er Athert re conce ructures. ical class	er-sca es, Har e gener es, Fill a outes co- ibutes format ctions. rmatio arsky con pol- epts, e Grapl ificatio	deopy ration a area fu olor and Enquir ions, 1 Raste n, view line c <u>ygon cl</u> diting nical us	devices, algorithr nctions, d Gray-s y functi- domoge er meti- ing func lipping. structur ser inter	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic faces and
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2 Unit: 3	ts:	system softwan genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin Structu modeli Interac functio	2 2 1 – ew of Gra , graphio re. Outp ting algo aracter g ites of o ll attribu- sional ( tes, affi- prmation g – Co g:Suther ures an ures an ng conce ctive inp	Reasona raphics for es moni- out primi- prithms, generation utput pri- utes, ch Geometr ine tra s. tal viewi- ohen S land-Ho d Hiera epts, hie ut meth fodels In	Systems tors and tives: Lin pixel ad- ons. <b>imitives</b> aracter <b>ic tran</b> nsforma <b>ing:</b> View utherlan odgman p prchical erarchica nods: The nteractiv	- Video d worksta ne drawir dressing, : Line att attributes <b>sformatic</b> tions, tr ving pipel d line d bolygon cl <b>Modeling</b> al modelin e user Dia e picture	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun ons: Bas ransformat ine, viewin clipping, Wil g: Structu ng with str alogue, log	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fund g transfo Liang Ba er Athert re conce uctures. ical class on techni	er-sca es, Har e gener es, Fill a outes co ibutes format ctions. ormatio arsky con poly epts, e Grapl ificatio iques.	deopy ration a area fu blor and Enquir ions, I Raste n, view line c ygon cli diting nical us n of inj	devices, algorithr nctions, d Gray-s y funct Homoge er met ing func lipping. structur ser inter put devi	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic faces and ces, Input
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2 Unit: 3	ts:	system softwar genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin Structu modeli Interac functio Three	2 2 1 – ew of Gra , graphio re. Outp ting algo aracter g ites of o ll attribu- sional C tes, aff ormation g – Co g:Suther ures and ng conce ctive inp ms and N – Dime	Reasona raphics f es moni ut primi prithms, generatio utput pri utes, ch Geometr ine tra s. al viewi ohen S land-Ho d Hiera epts, hie ut meth fodels In nsional	Systems tors and tives: Lin pixel ad- ons. imitives aracter ic tran nsforma ing: View utherlan odgman p prchical erarchica nods: The nteractiv object	- Video ( worksta) ne drawir dressing, : Line att attributes sformatic tions, tr ving pipel d line ( polygon cl Modeling al modelir e user Dia e picture represent	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun ons: Bas ransformat ine, viewin clipping, Wil g: Structu ng with str alogue, log constructio	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fund g transfo Liang Ba er Athert re conce uctures. ical class on techni oly-surfac	er-sca es, Har e gener es, Fill a outes co ibutes format ctions. ormatio arsky con poly epts, e Graph ificatio iques. ces cu	deopy ration a area fu blor and Enquir ions, 1 Raste n, view line c ggon cl diting nical us n of in ved lin	devices, algorithr nctions, d Gray-s y functi Homoge er met ing func lipping. structur ser inter put devi	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic faces and ces, Input surfaces,
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2 Unit: 3	ts:	system softwan genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin Structu modeli Interac functio Three spline	2 2 1 – ew of Gra , graphio re. Outp ting algo aracter g ites of o ll attribu- sional C tes, aff ormation g – Co g:Suther ures and ng conce ctive inp ms and N – Dime	Reasona aphics cs moni ut primi prithms, generation utes, ch Geometr ine tra s. al viewi ohen S land-Ho d Hiera epts, hie ut meth fodels In nsional ttation, I	Systems tors and tives: Lin pixel ado ons. imitives aracter ic tran nsforma ing: View utherlan odgman p rchical erarchica nods: The teractiv object	- Video ( worksta) ne drawir dressing, : Line att attributes sformatic tions, tr ving pipel d line ( polygon cl Modeling al modelir e user Dia e picture represent	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun ons: Bas ransformat ine, viewin clipping, Wil g: Structu ng with str alogue, log constructi tations: Po	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fund g transfo Liang Ba er Athert re conce uctures. ical class on techni oly-surfac	er-sca es, Har e gener es, Fill a outes co ibutes format ctions. ormatio arsky con poly epts, e Graph ificatio iques. ces cu	deopy ration a area fu blor and Enquir ions, 1 Raste n, view line c ggon cl diting nical us n of in ved lin	devices, algorithr nctions, d Gray-s y functi Homoge er met ing func lipping. structur ser inter put devi	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic faces and ces, Input surfaces,
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2 Unit: 3	ts:	system softwan genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin clippin Structu modeli Interac functio Three spline	2 2 1 – ew of Gi , graphic re. Outp ting algo aracter g ites of o ill attribu- sional ( tes, affi- ormation g – Co g:Suther ures and ng conce- ctive inp ons and M – Dime represer ds: Octre Dimens	Reasona raphics for the second rithms, rithms, reneration tates, ch Geometre ine trans- tal viewing band-Ho d Hiera epts, hier ut mether fodels In nsional tation, for tation, for for for for for for for for	Systems tors and tives: Lin pixel ado ons. imitives aracter ic tran nsforma ing: View utherlan odgman p rchical erarchica nods: The nteractiv object Bezier cu Trees. ransform	- Video o workstan ne drawir dressing, Line att attributes sformatic tions, tr ving pipel d line o polygon cl Modeling al modeling e picture represent urves ano	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun ons: Bas ransformat ine, viewin clipping, Wil g: Structu ng with str alogue, log constructions: Poo d surfaces Three dime	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fun- g transfo Liang Ba <u>er Athert</u> re conce ructures. ical class <u>on techni</u> oly-surfac s, B-Spli ensional	ter-sca es, Har e gener es, Fill a outes co ibutes format ctions. rrmatio arsky con poly epts, e Graph ificatio iques. ces cu ne cu viewin	deopy ration a area fu blor and Enquir ions, 1 Raste n, view line c ygon cl diting nical us n of inj vved lin rves an g: View	devices, algorithr nctions, d Gray-s y functi- domoge er met ing func lipping. structur ser inter put devi mes and nd surf	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic faces and ces, Input surfaces, ace, CSG
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2 Unit: 3 Unit: 4	ts:	system softwan genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin clippin structu modeli Interac functio Three spline Spline mothou Three	2 2 1 – ew of Gi , graphie re. Outp ting algo aracter g ites of o ill attribu- sional ( tes, affi- ormation g – Co g:Suther ures an ng conce- ctive inp ons and M – Dime represer ds: Octre Dimens- ions, Vis	Reasona raphics for the second rithms, rithms, reneration tates, ch Geometre ine trans- tal viewing baland-Ho d Hiera epts, hier ut mether fodels In nsional tation, for tation, for f	Systems tors and tives: Lin pixel ado ons. imitives aracter ic tran nsforma ing: View utherlan odgman p rchical erarchica hods: The nteractiv object Bezier cu Trees. ransform	- Video o workstan ne drawir dressing, Line att attributes sformatic tions, tr ving pipel d line o polygon cl Modeling al modelin e user Dia e picture represent urves ano nation: T	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun ons: Bas ransformat ine, viewin clipping, Wil g: Structu ng with str alogue, log constructions: Poo d surfaces Three dimo thods: Bacl	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fun- g transfo Liang Ba <u>er Athert</u> re conce uctures. ical class <u>on techni</u> oly-surfac s, B-Spli ensional c-face De	ter-sca es, Har e gener es, Fill a outes co ibutes format ctions. rrmatio arsky con poly epts, e Graph ificatio iques. ces cu ne cu viewin etectior	deopy ration a area fu blor and Enquir ions, I Raste n, view line c ygon cl diting nical us n of inj ved lin rved lin rves an g: View	devices, algorithr nctions, d Gray-s y functi- domoge er metl ing func lipping. structur ser inter put devi mes and nd surf ving co n-buffer	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic faces and ces, Input surfaces, ace, CSG ordinates, methods,
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2 Unit: 3 Unit: 4	ts:	system softwan genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin Structu modeli Interac functio Three spline Spline	2 2 1 – ew of Graven and the second secon	Reasona raphics for cs moni- ut primi- prithms, reneration utput pr- utes, ch Geometr ine tra s. land view bhen S land-Ho d Hiera epts, hie ut meth fodels In nsional tation, I res, BSP ional T ible surf nods, D	Systems tors and tives: Lin pixel ado ons. imitives aracter ic tran nsforma ing: View utherlan odgman p orchical erarchica nods: The nteractiv object Bezier cu Trees. ransform face dete epth-sor	- Video o workstan ne drawir dressing, :: Line att attributes sformatic tions, tr ving pipel d line o oolygon cl Modeling al modelin e picture represent urves ano nation: T oction met ting met	display dev tions. Inp ng algorith Filled area ributes, cu s, and Bun ons: Bas ransformat. ine, viewin clipping, Wil g: Structu ng with str alogue, log constructions: Pood d surfaces Three dime thods: Bach thods, BSI	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fund g transfo Liang Ba er Athert re conce uctures. ical class on techni oly-surfaces, B-Spli ensional c-face De P – Tre	er-sca es, Har e gener es, Fill a outes co- ibutes format ctions. rmatio arsky con pol- ificatio arsky epts, e Graph ificatio iques. ces cun ne cun viewin etectior e Met	dcopy ration a area fu olor and Enquir ions, 1 Raste n, view line c ygon cl diting nical us n of in ved lin rves an g: Viev h, Deptl hods,	devices, algorithr nctions, d Gray-s y functi- domoge er metl ing func lipping. structur ser inter put devi mes and nd surf ving co n-buffer	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic faces and ces, Input surfaces, ace, CSG ordinates, methods,
CO <sub>3</sub> CO <sub>4</sub> Detailed Conten Unit: 1 Unit: 2 Unit: 3 Unit: 4		system softwan genera and cha Attribu Area fi dimens ordinat transfo Two di clippin clippin Structu modeli Interac functio Three spline Methoo Three	2 2 1 – ew of Gra , graphic re. Outp ting algo aracter g ites of o ll attribu- sional C tes, affi- ormation: g – Co g:Suther ures an- ng conce- ctive inp ons and N – Dime represen- ds: Octree Dimension, Vis- ne meth- ds, Basic	Reasona raphics for cs moni- ut primi- prithms, reneration utput pri- utes, ch Geometr ine tra- s. cal viewi- bhen S land-Ho d Hiera epts, hie- ut mether fodels In- nsional T ible surfi- nods, D illumina	Systems tors and tives: Lin pixel ado ons. imitives aracter ic tran nsforma ing: View utherlan odgman p prchical erarchica nods: The teractiv object Bezier cu Trees. ransform face dete epth-son tions mo	- Video of workstame dressing, : Line att attributes sformatic tions, tr ving pipel d line of polygon cl Modeling al modelin e user Dia e picture represent urves and mation: T ection met ting met podels - Go	display dev tions. Inp ng algorith Filled area ributes, cu a, and Bun <b>ons:</b> Bas ransformat ine, viewin clipping, Wil g: Structung with str alogue, log constructions: Pood d surfaces Three dime thods: Back thods, BSI purand shae	ices, rast ut device ms, Circle primitive rve attrib dled attr ic trans ion fund g transfo Liang Ba er Athert re conce uctures. ical class on techni oly-surfac s, B-Spli ensional c-face De D – Tre ding phor	er-sca es, Har e gener es, Fill s outes co ibutes format ctions. ormatio arsky con poly epts, e Grapl ificatio iques. ces cur ne cur viewin etectior e Met ng shad	deopy ration a area fu olor and Enquiri ions, I Raste n, view line c ggon cl diting nical us n of in rves at g: View h, Deptl hods, ing.	devices, algorithr nctions, d Gray-s y functi- domoge er meth ing funce lipping. structur ser inter put devi mes and nd surf- ving co n-buffer	Graphics ns, ellipse cell array cale level, ons. <b>Two</b> nous co- nods for tions, line Polygon, res, Basic faces and ces, Input surfaces, ace, CSG ordinates, methods, o division

ns/ assignments/ quiz/ seminar presentation etc. and external evaluation (70 marks) which is mainly end semester
nination.
Books:
Heanry Donald, Pauline Baker M: Computer Graphics, PIH 2nd edn., 1995.
rence Books:
Harrington S: Computer Graphics A Programming Approach 2nd Edn. McGraw Hill,1987.
1

Course Code		Course Title								Lecture				
MTCS455PET										Т	P Semester: IV			
Version: 1.2		Date of Approval: 16th BoS 17-11-2022							4	0	0	-		
	Scheme	of Ins						Scheme o	of Exan	ninati	on			
No. o	f Periods		0 Hrs.					Ν	Maximu	ım Sc	core : 100			
	s/Week	: 4	: 4 Internal Evalu						valuat	ion	on : 30			
	Credits	: 4 End Sem						Semes	ster	: 70				
Instructi	on Mode	: Lecture Exam Dur							Durat	ion	:	3 Hrs.		
Prerequisite(s)	: Basic kno	wledg	e of statis	tics and	data ana	lysis								
Course Objecti														
1. Understand	d the princ	ciples a	and best p	ractices	of data v	isualizatio	on.							
2. Learn how	to select a	pprop	riate visua	lizations	s for diffe	erent type	es of data.							
3. Develop th	e skills to o	create	effective a	and visua	ally appe	aling visua	alizations ι	ising a va	riety o	f tool	s and	l techr	niques.	
4. Learn how	0	visuali	zations for	r clarity a	and simp	olicity.								
Course Outcon	nes (CO):													
COs No.		Statement									Mapped Program Outcomes (POs)			
CO <sub>1</sub>	Understa	nd the principles and best practices of data visualization, and be able <b>PO</b> <sub>1</sub> , <b>PO</b> <sub>2</sub>												
	to apply (	them to real-world datasets.												
CO <sub>2</sub>	Select ap	propr	iate visual	izations	for diffe	erent type	es of data	and com	munic	ate		<b>PO</b> <sub>2</sub> ,	PO <sub>3</sub>	
			using visu											
CO <sub>3</sub>			he skills to create effective and visually appealing visualizations using								$PO_4$ , $PO_5$			
		ty of tools and techniques.												
								PC	PO4, PO9, PO10					
			nsideratio											
PO <sub>1</sub> - Engineering														
problems, <b>PO</b> 5- N or team work, <b>PO</b>										, PO <sub>8</sub> -	Ethic	CS, <b>PO</b> 9	- Individua	
		mcatio					ith program							
Course													_	
Outcomes	PO <sub>1</sub>	$PO_2$	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	P	<b>D</b> <sub>10</sub>	PO <sub>11</sub>	PO <sub>12</sub>	
	3	2			ł	1		1						
		2	2		ł	1		1						
CO3		_		2	2	1		1						
CO <sub>4</sub>				2	† _	1		1	2		3			
	1		1-	_	able: 2 –	Significar	it; 3 – Stro	na		`		1	1	
Detailed Conte	nts:				,_			- 5						
		Introduction to Data Visualization: Definition and importance of data visualization; Basic												
Unit: 1													,	
		principles and best practices of data visualization; Types of data and visualizations Data Visualization Tools and Techniques: Overview of popular data visualization tools (e.g.												
		Tableau, Power BI, D3.js); Data preprocessing and cleaning; Mapping and geospatial												
Unit: 2		visualization; Basic charts and graphs (e.g. bar charts, line charts, scatter plots); Advanced												
		shorts and graphs (e.g. bartingraphis (e.g. bartingraphis), interviewed protos), interviewed and animeted												

charts and graphs (e.g. heatmaps, treemaps, network diagrams); Interactive and animated visualizations Designing Effective Visualizations: Principles of visual design (e.g. color theory, typography, Unit: 3 layout); Best practices for designing effective visualizations; Accessibility considerations in data visualization; Data storytelling and visual narrative Communicating Data Effectively: Understanding your audience and their needs; Incorporating narrative and context in visualizations; Designing for presentation and sharing Unit: 4 Evaluating and improving the effectiveness of your visualizations Final Project: Applying data visualization principles and techniques to a real-world dataset;

Unit: 5 Creating a portfolio-quality visualization project 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:

Data Visualization: A Practical Introduction" by Kieran Healy 1

Storytelling with Data: A Data Visualization Guide for Business Professionals" by Cole Nussbaumer Knaflic 2

**Reference Books:** 

Visualization Analysis and Design" by Tamara Munzner

2 Data Visualization: A Handbook for Data Driven Design" by Andy Kirk

Course Code										ture	Somostor II				
MTCS461PET Version: 1.2						Unit ComputingLh BoS 17-11-20224				T P 0 0	Semester: IV				
	Scheme o	) of Instru		ог аррго	Jval. 10tl	Scheme of Exam				÷ •					
	Periods	1 1	Hrs.							n Score		100			
	/ Week	: 4	1115.					luation	•	30					
Credits		: 4								emester	•	70			
Instructio									Duration : 3 H						
Prerequisite(s): Co										uration	•	5 111 5.			
Course Objectives	•	Gruph	105												
1. To understand		f GPU a	rchitectu	re, issue	s in map	ning algo	rithms ar	d differe	nt GPU	program	ming M	odels.			
2. To introduce p															
3. To acquaint er											PUs).				
4. To introduce t											,				
<b>Course Outcomes</b>		•	0												
COs No.	X /			St	tatemen	t				Мар	ped Pro	gram			
		alyze GPU architecture, assess their advantages and identify potential										Outcomes (POs) PO <sub>2</sub> , PO <sub>3</sub> , PO <sub>12</sub>			
CO <sub>1</sub>	Analyze														
		ware optimizations based on knowledge of the GPU architecture													
CO <sub>2</sub>		rstand the working proficiency with CUDA to optimize and debug										PO <sub>1</sub> , PO <sub>2</sub> , PO <sub>3</sub> , PO <sub>4</sub>			
	GPU cod														
	-	ent efficient algorithms, parallel programming patterns to solve PO <sub>2</sub> , PO <sub>3</sub> , PO <sub>4</sub> , PO <sub>5</sub>									94, <b>PO</b> 9				
		ld problems.													
CO <sub>4</sub>	-	hend the parallel programming techniques and implementation of									PO <sub>2</sub> , PO <sub>3</sub> , PO <sub>4</sub> , PO <sub>12</sub>				
	program														
PO <sub>1</sub> - Engineering Kn															
problems, <b>PO</b> <sub>5</sub> - Mod or team work, <b>PO</b> <sub>10</sub> -										PO <sub>8</sub> - Ethic	2S, PO <sub>9</sub> -	maiviaua			
01 team work, <b>PO</b> 10 <sup>-</sup>	Communic					omes with									
Course Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	<b>PO</b> <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	PO <sub>10</sub>	<b>PO</b> <sub>11</sub>	PO <sub>12</sub>			
CO <sub>1</sub>	101	2	1	104	103	100	10/	108	105	1010	101	3			
	3	2	2	1								0			
CO <sub>3</sub>	0	3	1	2					1						
CO <sub>4</sub>		2	3	1								1			
			1 – R	easonabl	e: 2 – Sia	gnificant;	3 – Stroi	ra	1						
<b>Detailed</b> Contents	:				•	<b>j j</b>		J							
		Introd	uction: I	listory,	Graphics	s Process	ors, Gra	phics Pro	ocessin	g Units,	GPGPU	s. Cloc			
						sons, Het									
I I : 1															
Unit: 1		CUDA Open CL / Open ACC, Hello World Computation Kernels, Launch parameters Thread hierarchy, Warps / Wave fronts, Thread blocks / Workgroups, Streaming													
		multiprocessors, 1D / 2D / 3D thread mapping, Device													
		multip	rocessor	s, 1D / 2	D / 3D t				cks /	workgro	ups, st	, cumin			
		proper	rties, Sim	ple Prog	rams.	hread ma	pping, D	evice	·						
		prope Memo	rties, Sim ry: Mem	ple Prog ory hier	rams. archy, E	hread ma	pping, Do	evice ocal / sh	ared, p	rivate /					
Unit: 2		proper Memo Consta	rties, Sim ry: Mem ant Memo	<u>ple Prog</u> ory hier ory, Poin	rams. archy, E ters, Par	hread ma	pping, D global, lo assing, A	evice cal / sh rrays and	ared, p dynam	rivate / ic	local, t	extures			
Unit: 2		proper Memo Consta Memo	rties, Sim ry: Mem ant Memo ry, Multi	<u>ple Prog</u> ory hier ory, Poin -dimensi	rams. archy, E ters, Par ional Arr	hread ma DRAM / § rameter P rays, Men	pping, D global, lc assing, A nory Allo	evice cal / sh rrays and cation, M	ared, p dynam 1emory	rivate / ic copying	local, t	extures			
Unit: 2		proper Memo Consta Memo Progra	rties, Sim ry: Mem ant Memo ry, Multi ams with	ple Prog ory hier ory, Poin -dimens matrices	rams. archy, E ters, Par ional Arr s, Perforr	hread ma DRAM / g cameter P rays, Men mance eva	pping, D global, lo assing, A nory Allo aluation	evice cal / sh rrays and cation, M with diffe	ared, p dynam Iemory rent me	rivate / ic copying emories.	local, t across	cextures devices			
Unit: 2		proper Memo Consta Memo Progra	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio	ple Prog ory hier ory, Poin -dimens matrices n: Memo	rams. archy, E ters, Par ional Arr s, Perforr ory Cons	hread ma DRAM / g rameter P rays, Men mance ev sistency,	pping, D global, lc assing, A nory Allo aluation v Barriers	evice cal / sh rrays and cation, M with diffe (local ve	ared, p dynam Aemory rent me ersus gl	rivate / ic copying emories. obal), At	local, t across omics,	extures devices Memor			
Unit: 2 Unit: 3		proper Memo Consta Memo Progra Synch fence.	rties, Sim ry: Mem ant Mem ry, Multi ams with ronizatio Prefix su	ple Prog ory hier ory, Poin -dimens matrices n: Memo m, Redu	rams. archy, D ters, Par ional Arr , Perforn ory Cons ction. Pr	hread ma DRAM / g rameter P rays, Men mance ev sistency, rograms f	pping, De global, Ic assing, A nory Allo aluation Barriers or concu	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat	ared, p dynam Iemory rent me ersus gl ca Struc	rivate / ic copying emories. obal), At tures suc	local, t across omics, ch as W	devices Memor ork lists			
		proper Memo Consta Memo Progra Synch fence. Linked	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su I-lists. Sy	ple Prog ory hier ory, Poin -dimensi matrices n: Memo m, Redu ynchroni	rams. archy, D ters, Par ional Arr o, Perforn ory Cons ction. Pr zation a	hread ma DRAM / g rameter P rays, Men mance ev sistency, rograms f across CI	pping, De global, lo assing, A nory Allo <u>aluation y</u> Barriers or concu PU and 0	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat GPU Fun	ared, p dynam Aemory rent mo ersus gl ca Struc actions:	rivate / ic copying emories. obal), At tures suc Device	local, t across omics, ch as W function	devices devices Memor ork lists ns, Hos			
		propen Memo Consta Memo Progra Synch fence. Linkec functio	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su I-lists. Sy ons, Kern	ple Prog ory hier ory, Poin -dimens matrices m. Memo m, Redu ynchroni els funct	rams. archy, E ters, Par ional Arr a, Perforr ory Cons ction. Pr zation a ions, Us	hread ma DRAM / g rameter P rays, Men mance eva sistency, rograms f across CH ing librar	pping, De global, lo assing, A nory Allo aluation Barriers or concu PU and d ies (such	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat GPU Fun as Thrus	ared, p dynam Aemory erent mo ersus gl ca Struc actions: t), and o	rivate / ic copying emories. obal), At tures suc Device levelopin	local, t across omics, ch as W function g librar	devices Memor ork lists ns, Hos ies.			
Unit: 3		propen Memo Consta Memo Progra Synch fence. Linkec functio	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su l-lists. Sy ons, Kern rt: Debu	ple Prog ory hier ory, Poin -dimens matrices n: Memo m, Redu ynchroni els funct ugging (	rams. archy, E ters, Par ional Arr , Perforr ory Cons ction. Pr zation a tions, Us GPU Pr	DRAM / grameter P rays, Men mance eva sistency, cograms f across CI sing librar rograms.	pping, D global, lo assing, A nory Allo aluation Barriers or concu PU and o ies (such Profiling	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat GPU Fun as Thrus g, Profile	ared, p dynam Memory rent mo rsus gl a Struc actions: t), and c e tools	rivate / ic copying emories. obal), At tures suc Device levelopin , Perform	local, t across omics, ch as W function og librar mance	devices Memor ork lists ns, Hos ies. aspect			
		propen Memo Consta Memo Progra Synch fence. Linkec functio Suppo Stream	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su l-lists. Sy ons, Kern rt: Debu ns: Async	ple Prog ory hier ory, Poin -dimens <u>matrices</u> n: Memo m, Redu ynchroni els funct ugging ( chronous	rams. archy, E ters, Par ional Aru , Perfori ory Cons ction. Pr zation a cions, Us GPU Pr a process	hread ma DRAM / g rameter P rays, Men mance eva sistency, rograms f across Cl ing librar rograms. sing, task	pping, D global, lo assing, A nory Allo aluation Barriers or concu PU and o ies (such Profiling s, Task-o	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat GPU Fun as Thrus g, Profile lependen	ared, p dynam Aemory rent mo ersus gl ca Struc- ictions: t), and c e tools ace, Ove	rivate / ic copying emories. obal), At tures suc Device levelopin , Perfori erlapped	local, t across omics, ch as W function ng librar mance data t	devices devices Memor ork lists ns, Hos ies. aspect ransfers			
Unit: 3		proper Memo Consta Memo Progra Synch fence. Linkeo functio Suppo Stream Defaul	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su l-lists. Sy ons, Kern rt: Debu ns: Async It Stream	ple Prog ory hier ory, Poin -dimens <u>matrices</u> n: Memo m, Redu ynchroni <u>els funct</u> ugging ( chronous , Synchi	rams. archy, E ters, Par ional Arr s, Perforn ory Cons ction. Pr zation a cions, Us GPU Pr s process conizatio	DRAM / g rameter P rays, Mer mance eva sistency, rograms f across CI ing librar rograms. sing, task on with s	pping, D global, lo assing, A nory Allo aluation Barriers or concu PU and 0 ies (such Profiling s, Task-o treams. 1	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat GPU Fun as Thrus g, Profile lependen Events, E	ared, p dynam Aemory rent ma ersus gl ca Struc- ictions: t), and c e tools ace, Ove	rivate / ic copying emories. obal), At tures suc Device levelopin , Perfori erlapped	local, t across omics, ch as W function ng librar mance data t	devices devices Memor ork lists ns, Hos ies. aspect ransfers			
Unit: 3		proper Memo Consta Memo Progra Synch fence. Linkec functio Suppo Stream Defaul Overla	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su l-lists. Sy ons, Kern rt: Debu ns: Async lt Stream apping da	ple Prog ory hier ory, Poin -dimensi <u>matrices</u> n: Memo m, Redu ynchroni <u>els funct</u> igging ( chronous d, Synchi ta transf	rams. archy, E ters, Par ional Arr ory Con- ction. Pr zation a cions, Us GPU Pr process conizatio er and k	DRAM / g cameter P rays, Mer mance ev sistency, cograms f across CI ing librar cograms. sing, task on with s ernel exe	pping, D global, lo assing, A nory Allo <u>aluation</u> Barriers or concu PU and 0 ies (such Profiling s, Task-o treams. 1 cution, p	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat GPU Fun as Thrus g, Profile lependen Events, E itfalls.	ared, p dynam Aemory rent mo ersus gl ca Struc actions: t), and o e tools ace, Ove vent-b	rivate / ic copying emories. obal), Ata tures suc Device levelopin , Perforn erlapped ased- Syn	local, t across omics, ch as W function g librar mance data t nchroni	devices devices Memor ork lists ns, Hos ies. aspect ransfers zation			
Unit: 3 Unit: 4		proper Memo Consta Memo Progra Synch fence. Linkec functio Suppo Stream Defaul Overla Image	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su d-lists. Sy ons, Kern rt: Debu ns: Async th Stream apping da Process	ple Prog ory hier ory, Poin -dimensi <u>matrices</u> n: Memo m, Redu ynchroni <u>els funct</u> igging ( hronous a, Synchi ta transf sing, (	rams. archy, D ters, Par ional Arn ory Con- ction. Pr zation a cions, Us GPU Pr process conizatio er and k araph	DRAM / g cameter P rays, Mer mance ev sistency, cograms f across CI ing librar rograms. sing, task on with s <u>ernel exe</u> algorithm	pping, D global, lo assing, A nory Allo <u>aluation</u> Barriers or concu PU and 0 ies (such Profiling s, Task-o treams. 1 <u>cution, p</u> s, Simu	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat GPU Fun as Thrus g, Profile lependen Events, E itfalls. ulations,	ared, p dynam Aemory rent me ersus gl ca Struct actions: t), and c e tools acce, Ove event-b Deep	rivate / ic copying emories. obal), At tures suc Device levelopin , Perforn erlapped ased- Syn Learni	local, t across omics, ch as W function g librar mance data t nchroni	devices devices Memor ork lists ns, Hos ies. aspect ransfers zation dvanced			
Unit: 3		proper Memo Consta Memo Progra Synch fence. Linkec functio Suppo Stream Defaul Overla Image topics	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su l-lists. Sy ons, Kern rt: Debu ns: Async lt Stream pping da Process : Dynam	ple Prog ory hier, ory, Poin -dimensi matrices n: Memo m, Redu ynchroni els funct igging ( chronous a, Synchi ta transf sing, C nic parall	rams. archy, E ters, Par ional Arn ory Con- ction. Pr zation a cions, Us GPU Pr process conizatio er and k araph elism, U	DRAM / g cameter P rays, Mer mance ev sistency, cograms f across CI ing librar cograms. sing, task on with s ernel exe	pping, D global, lo assing, A nory Allo <u>aluation</u> Barriers or concu PU and 0 ies (such Profiling s, Task-o treams. 1 <u>cution, p</u> s, Simu	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat GPU Fun as Thrus g, Profile lependen Events, E itfalls. ulations,	ared, p dynam Aemory rent me ersus gl ca Struct actions: t), and c e tools acce, Ove event-b Deep	rivate / ic copying emories. obal), At tures suc Device levelopin , Perforn erlapped ased- Syn Learni	local, t across omics, ch as W function g librar mance data t nchroni	devices devices Memor ork lists ns, Hos ies. aspect ransfers zation dvanced			
Unit: 3 Unit: 4 Unit: 5	Evaluatio	proper Memo Consta Memo Progra Synch fence. Linkec functio Suppo Stream Defaul Overla Image topics Hetero	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su l-lists. Sy ons, Kern rt: Debu ns: Async It Stream pping da Process : Dynam ogeneous	ple Prog ory hier, ory, Poin -dimensi matrices n: Memo m, Redu ynchroni els funct igging ( hronous a, Synchi ta transf sing, C nic parall process	rams. archy, E ters, Par ional Arr a, Perforn ory Con- ction. Pr zation a cions, Us GPU Pr a process conizatic er and k araph elism, U ing.	hread ma DRAM / g rameter P rays, Men mance eva sistency, rograms f across CI sing librar rograms. sing, task on with s ernel exe algorithm nified Vir	pping, De global, lo assing, A nory Allo aluation v Barriers or concu PU and C ies (such Profiling s, Task-o treams. I cution, p s, Simu tual Men	evice cal / sh rrays and cation, M with diffe (local ve (rrent Dat GPU Fun as Thrus g, Profile lependen Events, E itfalls. ilations, nory, Mul	ared, p dynam Memory rent mo rsus gl a Struc actions: t), and o tools tools ace, Ove vent-b Deep ti-GPU	rivate / ic copying emories. obal), At tures suc Device levelopin Perforn erlapped ased- Syn Learni processi	local, t across omics, ch as W function g librar mance data t nchroni	devices Memor ork lists ns, Hos ies. aspect ransfers zation dvances			
Unit: 3 Unit: 4		proper Memo Consta Memo Progra Synch fence. Linkec functio Suppo Stream Defaul Overla Image topics Hetero	rties, Sim ry: Mem ant Memo ry, Multi ams with ronizatio Prefix su l-lists. Sy ons, Kern rt: Debu ns: Async lt Stream pping da Process : Dynam ogeneous ern: It in	ple Prog ory hier ory, Poin -dimensi matrices n: Memo m, Redu ynchroni els funct igging ( chronous n, Synchi ta transf sing, C hic parall process clude bo	rams. archy, E ters, Par ional Arr , Perforn ory Cons ction. Pr zation a cions, Us GPU Pr a process conizatio er and k braph a elism, U ing.	hread ma DRAM / g rameter P rays, Men mance eva sistency, rograms f across CI bing librar rograms. sing, task on with s <u>ernel exe</u> algorithm nified Vir	pping, D global, lo assing, A nory Allo aluation Barriers or concu PU and 0 ies (such Profiling s, Task-o treams. 1 <u>cution, p</u> s, Simu tual Men ation (30	evice cal / sh rrays and cation, M with diffe (local ve rrent Dat GPU Fun as Thrus GPU Fun as Thrus c, Profile lependen Events, E itfalls. ulations, nory, Mul O marks)	ared, p dynam Memory rent mo ersus gl a Struc- icctions: t), and c e tools icce, Ove vent-b Deep ti-GPU compri	rivate / ic copying emories. obal), At tures suc Device developin , Perforn erlapped ased- Syn Learni processi	local, t across omics, ch as W function glibrar mance data t nchroni ing. A ng, Pee	device: Memor ork list: ns, Hos ies. aspect ransfer: zation dvance r acces: session:			

Text	Books:
1	Shane Cook, CUDA Programming: -A Developer's Guide to Parallel Computing with GPUs (Applications of
	GPU Computing), First Edition, Morgan Kaufmann, 2012
2	David R. Kaeli, Perhaad Mistry, Dana Schaa, Dong Ping Zhang, -Heterogeneous computing with OpenCL, 3rd
	Edition, Morgan Kauffman, 2015.
Refe	rence Books:
1	Jason Sanders, Edward Kandrot, -CUDA by Example: An Introduction to General Purpose GPU Programming,
	Addison – Wesley, 2010
2	Nicholas Wilt, —CUDA Handbook: A Comprehensive Guide to GPU Programming, Addison – Wesley, 2013.

MTCS462	ode				Course					cture	l	
	PET					ta Analysi				T P	Se	emester: IV
Version: 1.2	~ 1			e of App	roval: 16	th BoS 17-		~ 1	-	0 0		
			ruction					Scheme of				100
	Periods		Hrs.							m Score	:	100 30
Periods	s/ Week Credits	: 4						Int		aluation emester	:	<u> </u>
Instructio		· -	cture							Duration		70 3 Hrs.
Prerequisite(s				hematic	2				Exam	Juiation	·	51115.
Course Object	1	nowieug		incinatio	3							
l. To provide							s, probabili	ty and mo	odeling t	he real-li	fe pr	oblems.
							is, correlat	ion and re	gressio	n.		
	erstand th								0			
<b>Course Outco</b>			• • •		Ŭ							
COs No.					Statem	nent						l Program
							01		nes (POs)			
CO <sub>1</sub>	Ар	ply diffe	erent stat	istical m	easures	on data.					<b>P0</b> 1	, <b>P02</b>
CO <sub>2</sub>	An	alyze st	atistical t	ests in t	esting hy	ypotheses	on data.				F	<b>?</b> 05
CO <sub>3</sub>		ply conc oblems.	ept of pro	bability a	nd statis	tics to tran	slate and so	olve real wo	orld		P	02
CO <sub>4</sub>		velop p obabiliti		solving	technic	jues need	led to ac	curately	calculat	te	P	04
PO <sub>1</sub> - Engineerir problems, PO <sub>5</sub> - or team work, P	Modern to	ool usage	, <b>PO</b> 6- The	e enginee	r and soc	eiety, PO7-	- Environmen	t and susta	inability			
,							with progr					
Course	DO	DO					1 0			DO	D	
Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	P	O <sub>11</sub> PO <sub>1</sub>
CO <sub>1</sub>	2	2										
$CO_2$					2							
<b>CO</b> <sub>3</sub>												
CO <sub>3</sub> CO <sub>4</sub>		2		2	CO4     2       1 - Reasonable; 2 - Significant; 3 - Strong							
CO <sub>4</sub>		2	1	_	nable; 2	– Signific	ant; 3 – Sti	rong				
CO <sub>4</sub>	ents:			– Reaso		0 0		0				
CO <sub>4</sub> Detailed Cont		Basic	Statistic	<b>- Reaso</b> s: Frequ	iency D	istributio	n, Freque	ncy curv				easures of
CO <sub>4</sub>		Basic Centra	Statistic al Tende	<b>- Reaso</b> s: Frequencies (1	iency D Mean, M	istributio Aedian, N	n, Freque Aode, Ran	ncy curve ge, Stane	dard D	eviation,	Coe	fficient of
CO <sub>4</sub> Detailed Cont		Basic Centra Variat	Statistic al Tende ion, Qua	s: Frequencies (1 rtiles), M	iency D Mean, M leasures	istributio Aedian, M s of Dispe	n, Freque Aode, Ran rsion, Ske	ncy curv ge, Stan wness, m	dard Do oments	eviation, and kurt	Coe osis.	fficient of
CO <sub>4</sub> Detailed Cont		Basic Centra Variat Regres	Statistic al Tende ion, Qua ssion An	<b>- Reaso</b> s: Frequencies (1 rtiles), M alysis: C	iency D Mean, M leasures orrelatio	istributio Aedian, M s of Dispe on and Re	n, Freque Aode, Ran rsion, Ske egression:	ncy curve ge, Stane wness, m Karl Pear	dard Do oments rson's c	eviation, and kurt oefficient	Coe cosis. t of (	fficient of
CO <sub>4</sub> Detailed Cont	L	Basic Centra Variat Regres Correl	Statistic al Tende ion, Qua ssion Ana ation of	s: Freque encies (l rtiles), M alysis: C ranks, '	iency D Mean, M Measures orrelatio Tied Ra	istributio Median, M s of Dispe on and Re nks, Curv	n, Freque Aode, Ran ersion, Ske egression: ve of regro	ncy curve ge, Stane wness, m Karl Pear ession, lir	dard Do oments rson's co nes of r	eviation, and kurt oefficient regression	Coe cosis. t of ( n, pr	fficient of Correlation coperties of
CO₄ Detailed Cont Unit: 1	L	Basic Centra Variat Regres Correl regres	Statistic al Tende ion, Qua ssion Ana ation of ssion coe	s: Freque encies (l rtiles), M alysis: C ranks, '	iency D Mean, M Measures orrelatio Tied Ra s and an	istributio Median, M s of Dispe on and Re nks, Curv gle betwo	n, Freque Mode, Ran ersion, Ske egression: ve of regre een two re	ncy curv ge, Stan wness, m Karl Pea ession, lin egression	dard Do oments rson's co nes of r	eviation, and kurt oefficient regression	Coe cosis. t of ( n, pr	fficient of
CO₄ Detailed Cont Unit: 1	L	Basic Centra Variat Regres Correl regres least s	Statistic al Tende ion, Qua ssion Ana ation of sion coe quare, L	<b>- Reaso</b> s: Frequencies (I rtiles), M alysis: C ranks, ' fficients inear an	iency D Mean, M Measures orrelatio Tied Ra s and an d reduc	istributio Median, M s of Dispe on and Re nks, Curv igle betwo ible to lin	n, Freque Mode, Ran ersion, Ske egression: ve of regre een two re ear curves	ncy curve ge, Stane wness, m Karl Pear ession, lir egression s.	dard Do oments rson's co nes of r lines C	eviation, <u>and kurt</u> oefficient egression curve fitti	Coe cosis. t of ( n, pr ng –	fficient of Correlation operties of Method of
CO₄ Detailed Cont Unit: 1	L	Basic Centra Variat Regres Correl regres least s Rando	Statistic al Tende ion, Qua ssion An ation of sion coe quare, L m Varia	s: Frequencies (1 rtiles), M alysis: C ranks, ' fficients inear an ables ar	iency D Mean, M Measures orrelatio Tied Ra s and an d reduc nd Prob	istributio Median, M s of Dispe on and Re nks, Curv gle betwo ible to lin pability T	n, Freque Mode, Ran ersion, Ske egression: ve of regro een two ro ear curves Distributio	ncy curve ge, Stane wness, m Karl Pear ession, lir egression s. n: Rane	dard Do oments rson's co nes of r lines C dom Va	eviation, and kurt oefficient regression curve fitti ariable -	Coe cosis. t of C n, pr ng – - Di	fficient of Correlation operties of Method of screte an
CO₄ Detailed Cont Unit: 1 Unit: 2	2	Basic Centra Variat Regres Correl regres least s Rando Contir	Statistic al Tende ion, Qua ssion Ana ation of sion coe quare, L m Varia nuous, P	<b>- Reaso</b> s: Frequencies (I rtiles), M alysis: C ranks, ' fficients inear an ibles ar robabili	iency D Mean, M Aeasures orrelatio Tied Ra s and an d reduc nd Prot ty Distr	istributio Median, M s of Dispe on and Re nks, Curv gle betwe ible to lin pability I ibution c	n, Freque Mode, Ran rsion, Ske egression: 7e of regre een two re ear curves Distributio of a Rando	ncy curve ge, Stan wness, m Karl Pear ession, lin egression s. n: Ran om Varia	dard De oments cson's c nes of r lines C dom Va ble, Pro	eviation, and kurt oefficient egression urve fitti ariable - obability	Coe cosis. t of C n, pr ng – - Di Mas	fficient of Correlation operties of Method of screte an s Function
CO₄ Detailed Cont Unit: 1	2	Basic Centra Variat Regree Correl regres least s Rando Contir Probal	Statistic al Tende ion, Qua ssion Ana ation of sion coe quare, L m Varia nuous, P bility De	s: Freque encies (I rtiles), M alysis: C ranks, ' fficients inear an ables ar robabili nsity Fu	iency D Mean, M Aeasures orrelatio Tied Ra s and an d reduce nd Prob ty Distr nction,	istributio Median, M s of Dispe on and Re nks, Curv gle betwe ible to lin pability I ibution c -evaluatio	n, Freque Mode, Ran rsion, Ske egression: ve of regro een two ro ear curves Distributio of a Rando on of stati	ncy curve ge, Stan- wness, m Karl Pear ession, lin egression s. n: Rane om Varia stical par	dard De oments rson's c nes of r lines C dom Va ble, Pro rameter	eviation, and kurt oefficient egression urve fitti ariable - obability s for thes	Coe cosis. t of C n, pr ng – Di Mass se di	fficient of Correlation operties of Method of screte an s Function stribution
CO₄ Detailed Cont Unit: 1 Unit: 2	2	Basic Centra Variat Regres Correl regres least s Rando Contir Probal Distrit	Statistic al Tende ion, Qua ssion Ana lation of sion coe quare, L m Varia nuous, P bility De pution F	s: Frequencies (I rtiles), M alysis: C ranks, ' inficients inear an ibles ar robabili- nsity Fu unctions	iency D Mean, M <u>Aeasures</u> orrelatio Tied Ra s and an <u>d reduc</u> ad reduc ty Distr nction, s, Bivari	istributio Median, M s of Dispe on and Re nks, Curv gle betwe ible to lin oability I ibution c -evaluation iate Ranc	n, Freque Mode, Ran ersion, Ske egression: ve of regro een two ro ear curves Distributio of a Rando on of stati lom Varia	ncy curv ge, Stan wness, m Karl Pear ession, lin egression s. n: Ran om Varia stical par ble- Disc	dard De oments rson's c nes of r lines C dom Va ble, Pro rameter crete an	eviation, and kurt oefficient egression urve fitti ariable - obability s for these nd Contin	Coe cosis. t of C n, pr ng – Di Mass se di nuou	fficient of Correlation operties of Method of
CO₄ Detailed Cont Unit: 1 Unit: 2	2	Basic Centra Variat Regres Correl regres least s Rando Contir Probal Distrik Rando distrib	Statistic al Tende ion, Qua ssion Ana lation of ssion coe quare, L m Varia nuous, P bility De bility De pution F m Varial putions a	s: Freque encies (I rtiles), M alysis: C ranks, ' fficients inear an ables ar robabili nsity Fu unctions oles with nd appli	iency D Mean, M Aeasures orrelatio Tied Ra s and an <u>d reduc</u> nd Prob ty Distr nction, s, Bivari h examp cations,	istributio Median, M s of Dispe on and Re nks, Curv gle betwo ible to lin bability I ibution c -evaluation iate Ranc bles, Joint Probabili	n, Freque Mode, Ran ersion, Ske egression: ve of regre een two re ear curves Distributio of a Rande on of stati lom Varia probabili	ncy curv ge, Stan wness, m Karl Pea ession, lin egression si com Varia stical par ble- Disc ty distrib	dard De oments cson's c nes of r lines C dom Va ble, Pro cameter crete an oution, N	eviation, and kurt oefficient regression urve fitti ariable - obability s for thes nd Contin Marginal	Coe cosis. t of C n, pr ng – Di Mass se di nuou and	fficient of Correlation operties of Method of screte an s Function stributions us Bivariat conditiona
CO₄ Detailed Cont Unit: 1 Unit: 2	3	Basic Centra Variat Regres Correl regres least s Rando Contir Probal Distrit Rando distrit Distrit	Statistic al Tende ion, Qua ssion Ana lation of sion coe quare, L m Varia puous, P bility De pution F m Varial putions a putions:	s: Freque encies (I rtiles), M alysis: C ranks, ' fficients inear an ables ar robabilit nsity Fu unctions oles with nd appli Binomia	lency D Mean, M Aeasures orrelatio Tied Ra s and an d reduc nd Prot ty Distr nction, s, Bivari h examp cations, al, Poiss	istributio Median, M s of Dispe on and Re nks, Curv gle betwe ible to lin bability I ibution c -evaluation iate Ranc bles, Joint Probabili on and 1	n, Freque Mode, Ran ersion, Ske egression: ve of regre een two re ear curves Distributio of a Rande on of stati lom Varia probabili ity Normal -	ncy curv ge, Stan wness, m Karl Pea ession, lin egression si com Varia stical par ble- Disc ty distrib	dard De oments cson's c nes of r lines C dom Va ble, Pro cameter crete an oution, N	eviation, and kurt oefficient regression urve fitti ariable - obability s for thes nd Contin Marginal	Coe cosis. t of C n, pr ng – Di Mass se di nuou and	fficient of Correlation operties of Method of screte an s Function stributions is Bivariat
CO₄ Detailed Cont Unit: 1 Unit: 2 Unit: 3	3	Basic Centra Variat Regres Correl regres least s Rando Contir Probal Distrik Rando distrik Distrik	Statistic al Tende ion, Qua ssion Ana lation of sion coe quare, L m Varia puous, P bility De pution F m Varial putions a putions: three dis	s: Frequencies (I rtiles), M alysis: C ranks, ' fficients inear an ables ar robability noity Fu unctions oles with nd appli Binomia tributio	Mean, M Measures orrelation Tied Ra s and an <u>d reduc</u> nd Protect ty Distr nction, s, Bivaria h examp cations, al, Poiss ns and a	istributio Median, M s of Dispe on and Re nks, Curv gle betwe ible to lin bability I ibution c -evaluation ibution c -evaluation iate Ranc oles, Joint Probabili ion and I applicatio	n, Freque Mode, Ran ersion, Ske egression: ve of regre een two re ear curves Distributio of a Rande on of stati lom Varia probabili ity Normal – ns.	ncy curve ge, Stand wness, m Karl Pear ession, lin egression a. n: Rand om Varia stical par ble- Disc ty distrib evaluatic	dard De oments cson's consecutions of r lines C dom Va ble, Pro- cameter crete an oution, N	eviation, and kurt oefficient egression durve fitti ariable - obability s for thes nd Contin Marginal	Coe cosis. t of C n, pr ng – - Di Mase se di nuou and para	fficient of Correlation operties of Method of screte an s Function stributions us Bivariat conditiona
CO₄ Detailed Cont Unit: 1 Unit: 2 Unit: 3	3	Basic Centra Variat Regres Correl regres least s Rando Contir Probal Distrik Rando distrik Distrik these Sampl	Statistic al Tende ion, Qua ssion Ana lation of sion coe quare, L m Varia nuous, P bility De bution F m Varial putions a putions: three dis ing Dist	s: Frequencies (I rtiles), M alysis: C ranks, ' fficients inear an ibles ar robabili- nsity Fu unctions oles with nd appli- Binomia stributio ribution	lency D Mean, M <u>Measures</u> orrelation Tied Ra s and an <u>d reduc</u> and Prob ty Distr nction, s, Bivarion h examp cations, al, Poiss ns and a : Test o	istributio Median, M s of Dispe on and Re nks, Curv gle betwe gle betwe ible to lin pability I ibution c -evaluation cate Ranc bles, Joint Probabilition and I applicatio of signific	n, Freque Mode, Ran rsion, Ske egression: ve of regre een two re ear curves Distributio of a Rande on of stati lom Varia probabili ity Normal - ns. cance for	ncy curve ge, Stan- wness, m Karl Pear ession, lir egression si com Varia stical par ble- Disc ty distrib evaluatic large &	dard De oments rson's consoleters lines of r lines C dom Va ble, Pro- rameter crete an ution, N on of st small	eviation, and kurt oefficient egression eurve fitti ariable - obability s for thes nd Conti Marginal catistical samples:	Coe cosis. t of C n, pr ng – - Di Mass se di nuou and para test	fficient of Correlation operties of Method of screte an s Function stributions is Bivariat conditiona imeters for
CO₄ Detailed Cont Unit: 1 Unit: 2 Unit: 3 Unit: 4	2 3 4	Basic Centra Variat Regres Correl regres least s Rando Contir Probal Distrik Rando distrik Distrik these Sampl propo	Statistic al Tende ion, Qua ssion Ana lation of sion coe quare, L m Varia puous, P bility De bution F m Varial putions a putions: three dis ing Dist rtion, dif	<b>- Reaso</b> s: Frequencies (I rtiles), M alysis: C ranks, ' fficients inear an ables ar robabili- noity Fu unctions oles with nd appli Binomia stribution ribution ference	ency D Mean, M <u>Measures</u> orrelation Tied Ra s and an <u>d reduc</u> and Prob ty Distr nction, s, Bivaria h examp <u>cations</u> , al, Poiss <u>ns and a</u> : Test of of prop	istributio Median, M s of Dispe on and Re nks, Curv gle betwe ible to lin pability I ibution c -evaluatio iate Ranc bles, Joint <u>Probabili</u> on and I <u>applicatio</u> of signifi- portions, s	n, Freque Mode, Ran rsion, Ske egression: ve of regre een two re ear curves Distributio of a Rande on of stati lom Varia probabili ity Normal - ns. cance for single mea	ncy curve ge, Stan wness, m Karl Pear ession, lir egression s. n: Rand om Varia stical par ble- Disc ty distrib evaluatic large & n, differe	dard De oments rson's consoler of r lines of r lines C dom Va ble, Pro- rameter crete an oution, N on of st small ince of r	eviation, and kurt oefficient egression urve fitti ariable - obability s for these nd Contin Marginal catistical samples: means, an	Coe cosis. t of C n, pr ng – Di Mass se di nuou and para test	fficient of Correlation coperties of Method of screte an s Function stributions to Bivariat conditionation interes for for singlifference of
CO₄ Detailed Cont Unit: 1 Unit: 2 Unit: 3	2 3 4	Basic Centra Variat Regres Correl regress least s Rando Contir Probal Distrik Rando distrik Distrik these Sampl propo standa	Statistic al Tende ion, Qua ssion Ana lation of ssion coe quare, L m Varia nuous, P bility De bility De bution F m Varial putions a putions: three dis ing Dist rtion, dif ard devia	s: Freque encies (I rtiles), M alysis: C ranks, ' afficients inear an ables ar robabili- noity Fu unctions oles with nd appli Binomia ctribution ference ations S	ency D Mean, M <u>Measures</u> orrelation Tied Ra s and an <u>d reduct</u> and Prob ty Distr nction, s, Bivaria h examp <u>cations,</u> al, Poiss <u>ns and a</u> : Test of of prop ampling	istributio Median, M s of Dispe on and Re nks, Curv gle betwe ible to lin bability I ibution c -evaluation iate Ranc bles, Joint Probabili on and I applicatio of signifi- ortions, s g Distribu	n, Freque Mode, Ran rsion, Ske egression: ve of regre een two re ear curves Distributio of a Rando on of stati lom Varia probabili ty Normal - ns. cance for single mea tions: t-	ncy curve ge, Stand wness, m Karl Pear ession, lin egression n: Rand om Varia stical par ble- Disc ty distrib evaluation large & n, differe distributi	dard De oments rson's consoleters lines of r lines C dom Va ble, Pro- cameter crete an ution, N on of st small on, Chi	eviation, and kurt oefficient egression eurve fitti ariable - obability s for thes nd Conti Marginal catistical samples: means, an i-square	Coe cosis. t of C n, pr ng – Di Mass se di nuou and para test nd di distr	fficient of Correlation operties of Method of screte an s Function stributions is Bivariat conditionation imeters for for single ifference of ibution, F
CO₄ Detailed Cont Unit: 1 Unit: 2 Unit: 3 Unit: 4	2 3 4	Basic Centra Variat Regree Correl regress least s Rando Contir Probal Distrik Rando distrik these Sampl propo standa distrik	Statistic al Tende ion, Qua ssion Ana lation of ssion coe quare, L m Varia puous, P bility De bility De bility De bility De bution F m Varial putions a putions a putions: three dis ing Dist rtion, dif ard devia pution, S	<b>- Reaso</b> s: Frequencies (I rtiles), M alysis: C ranks, ' afficients inear an ables ar robabili- nobabili-	iency D Mean, M <u>Aeasures</u> orrelation Tied Ra s and an <u>d reduc</u> and Prob ty Distr nction, s, Bivarion h examp <u>cations, al</u> , Poiss <u>ns and a</u> : Test of of prop ampling and Pr	istributio Median, M s of Dispe on and Re nks, Curv gle betwo ible to lin bability I ibution c -evaluation iate Ranc bles, Joint Probabili on and I applicatio of signifi- portions, s g Distribu obable en	n, Freque Mode, Ran rsion, Ske egression: ve of regre een two re ear curves Distributio of a Rando on of stati lom Varia probabili ty Normal – ns. cance for single mea ttions: t– rors, Diffe	ncy curve ge, Stand wness, m Karl Pear ession, lin egression n: Rand om Varia stical par ble- Disc ty distrib evaluatic large & n, differe distributi erent Me	dard De oments cson's c hes of r lines C dom Va ble, Pro- cameter crete ar oution, N on of st small on, Chi thods c	eviation, and kurt oefficient regression burve fitti ariable - obability s for thes nd Contin Marginal catistical samples: means, an i-square of Estima	Coe osis. t of C n, pr ng – Di Mass se di nuou and para test di distr tion,	fficient of Correlation operties of Method of screte an s Function stributions is Bivariat conditionation imeters for for single ifference of ibution, F Testing of
CO₄ Detailed Cont Unit: 1 Unit: 2 Unit: 3 Unit: 4	2 3 4	Basic Centra Variat Regres Correl regres least s Rando Contir Probal Distrib Rando distrib these Sampl propo standa distrib Hypot	Statistic al Tende ion, Qua ssion Ana lation of ssion coe quare, L m Varia puous, P bility De bility De bility De bility De bution F m Varial putions a putions a putions: three dis ing Dist rtion, dif ard devia pution, S	<b>- Reaso</b> s: Frequencies (I rtiles), M alysis: C ranks, ' afficients inear an ables ar robabili- nobabili-	iency D Mean, M <u>Aeasures</u> orrelation Tied Ra s and an <u>d reduc</u> and Prob ty Distr nction, s, Bivarion h examp <u>cations, al</u> , Poiss <u>ns and a</u> : Test of of prop ampling and Pr	istributio Median, M s of Dispe on and Re nks, Curv gle betwo ible to lin bability I ibution c -evaluation iate Ranc bles, Joint Probabili on and I applicatio of signifi- portions, s g Distribu obable en	n, Freque Mode, Ran rsion, Ske egression: ve of regre een two re ear curves Distributio of a Rando on of stati lom Varia probabili ty Normal – ns. cance for single mea ttions: t– rors, Diffe	ncy curve ge, Stand wness, m Karl Pear ession, lin egression n: Rand om Varia stical par ble- Disc ty distrib evaluatic large & n, differe distributi erent Me	dard De oments cson's c hes of r lines C dom Va ble, Pro- cameter crete ar oution, N on of st small on, Chi thods c	eviation, and kurt oefficient regression burve fitti ariable - obability s for thes nd Contin Marginal catistical samples: means, an i-square of Estima	Coe osis. t of C n, pr ng – Di Mass se di nuou and para test di distr tion,	fficient of Correlation operties of Method of screte an s Function stributions is Bivariat conditionation imeters for for single ifference of ibution, F

exam	ination.
Text	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	rence 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 CodeCourse TMTCS463PETEmbedded S										ture		
	ET						44 0.000		L	T P	Sei	nester: IV
Version: 1.2	0.1	67.4		e of Appr	<b>:oval:</b> 16t	h BoS 17-		. 1	4	0 0		
N	Scheme						5	Scheme of				100
	Periods	: 601	Hrs.							n Score	:	100
Periods	/	: 4 : 4						Inte		aluation	:	30
	Credits	-	tuno					1		emester	:	70 2 Uma
Instructio			ture						Exam L	uration	:	3 Hrs.
Prerequisite(s): Course Objectiv		intellige	nce									
1. To provide a		tanding	of the fu	Indamen	tal conc	ents and o	romponent	s of embe	dded s	veteme		
<ol> <li>To develo microcontro</li> <li>To introduce</li> <li>To provide h</li> </ol>	p the ollers/mi e the con nands-on	skills croproce cepts of	require essors ar real-tim	ed to nd progra ne operat	design amming ing syste	, imple languages ems and t	ment an s. heir role in	d test the desig	embe gn of er	dded s		ms.
Course Outcom	es (CO):											
COs No.					Statem	ent						Program
										01		es (POs)
	-		-		mponen		edded syst	ems.				$PO_2$
	Design	and		lement	an	embe		system	usir	ng	PO <sub>2</sub>	PO <sub>3</sub>
						0	ng languag					
	system.		•	0		-	he design			ed	PO <sub>4</sub>	, <b>PO</b> ₅
CO <sub>4</sub>	Apply int	erfacing	techniq	ues and t	ools cor	nmonly u	sed in emb	edded sys	stems.	PC	$\mathbf{D}_4, \mathbf{\overline{P}}_4$	<b>D</b> <sub>9</sub> , <b>PO</b> <sub>10</sub>
PO <sub>1</sub> - Engineering 1 problems, PO <sub>5</sub> - Me or team work, PO <sub>10</sub>	odern tool	usage, P	<b>0</b> 6- The e PO11- Pro	engineer a ject mana	nd societ gement a	ty, <b>PO</b> 7- En nd finance	vironment a	and sustain long Learn	ability, ing			
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	РО	11 <b>PO</b> 12
Outcomes	0	0										
<u>CO1</u>	3	2	0									
		2	2	2	2							
<u>CO3</u>				2	Z				0	0		
CO <sub>4</sub>				2	110	n::c:	4.0 04		2	3		
						Sianifican						
	4		1-	Reasona	ibie; 2 – 3	Significan	u, 5 - Stioi	iy				
Detailed Conten	its:	Testa a la			•	0 0	•	0				
<b>Detailed Conten</b> Unit: 1	its:		iction to	) Embedo	led Syst	ems: Defi	nition, Cha	aracteristi				
	its:	System	iction to	) Embedo cecture o	led Syst	ems: Defi	nition, Cha	aracteristi				
Detailed Conten Unit: 1 Unit: 2	its:	System Embed Microc Microp	action to s; Archit ded Syst ontroller rocesso	Embedo Eecture o Eems rs and rs; Archit	led Syst f Embed Micr cecture a	ems: Defi ded Syste oprocesse and Memo	nition, Cha ems; Comp ors: Intro ory Organiz	aracteristi onents of oduction zation; Int	an Em	bedded S	Syster	n; Types o lers and
Unit: 1	ts:	System Embed Microc Microp Compa	iction to s; Archit ded Syst ontroller rocessor rison be	Embedd Eecture o Eems rs and rs; Archit tween M	led Syst f Embed Micr ecture a icrocont	ems: Defi Ided Syste oprocesse and Memc crollers ar	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro	aracteristi onents of oduction zation; Int ocessors	an Em to erfacin	bedded S Microco g with Pe	Syster ontrol eriphe	n; Types o lers and erals
Unit: 1 Unit: 2	ts:	System Embed Microc Microp Compa Assemb	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang	Embedo cecture o cems rs and rs; Archit tween M guage P	led Syst f Embed Micr ecture a icrocont rogramm	ems: Defi Ided Syste oprocesse and Memo crollers an ning: Int	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction	aracteristi onents of oduction zation; Int ocessors to Asse	to to erfacin mbly l	Microco g with Pe Language	Syster ontrol eriphe Pro	n; Types o lers and erals gramming
Unit: 1	ts:	System Embed Microc Microp Compa Assemt Instruc	iction to is; Archit ded Syst ontroller rocessor rison be oly Lang tion Se	Embeda Eccture o Eems rs and rs; Archit tween M guage P et Archi	ded Syst f Embed Micr ecture a icrocont rogramm tecture	ems: Defi Ided Syste oprocesse and Memo crollers an ning: Int	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro	aracteristi onents of oduction zation; Int ocessors to Asse	to to erfacin mbly l	Microco g with Pe Language	Syster ontrol eriphe Pro	n; Types o lers and erals gramming
Unit: 1 Unit: 2	<u>ts:</u>	System Embed Microc Microp Compa Assemt Instruc Optimi	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang tion Se zation T	Embedo cecture o cems rs and rs; Archit tween M guage P guage P et Archi echnique	ded Syst f Embed Micr ecture a icrocont rogramn tecture es	ems: Defi Ided Syste oprocesse and Memo rollers an ning: Int (ISA); F	nition, Cha ems; Comp ors: Intro ory Organiz nd Micropro roduction Programmi	aracteristi onents of oduction zation; Int ocessors to Asse ng Tech	to to erfacin mbly l niques	Microcc g with Pe Language and E	Syster ontrol eriphe e Pro xamp	n; Types o lers and gramming les; Code
Unit: 1 Unit: 2 Unit: 3	ts:	System Embed Microp Compa Assemt Instruc Optimi Embed	iction to is; Archit ded Syst ontroller rocesson rison be rison be bly Lang tion Se zation To ded C	Embeda Eecture o Eems rs and rs; Archit tween M guage P guage P et Archi echnique Program	ded Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I	ems: Defi Ided Syste oprocesso and Memo crollers ar ning: Int (ISA); F	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em	aracteristi onents of oduction zation; Int <u>ocessors</u> to Asse ng Tech	an Em to erfacin mbly I niques C Pro	Microcc g with Pe Language and E grammin	Syster ontrol eriphe e Pro xamp g; Da	n; Types c lers and gramming les; Cod ata Types
Unit: 1 Unit: 2	ts:	System Embed Microp Compa Assemt Instruc Optimi Embed Variabl	iction to is; Archit ded Syst ontroller rocesson rison be rison be bly Lang tion Se zation To ded C	Embeda Eecture o Eems rs and rs; Archit tween M guage P guage P et Archi echnique Program	ded Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I	ems: Defi Ided Syste oprocesso and Memo crollers ar ning: Int (ISA); F	nition, Cha ems; Comp ors: Intro ory Organiz nd Micropro roduction Programmi	aracteristi onents of oduction zation; Int <u>ocessors</u> to Asse ng Tech	an Em to erfacin mbly I niques C Pro	Microcc g with Pe Language and E grammin	Syster ontrol eriphe e Pro xamp g; Da	n; Types c lers and gramming les; Cod ata Types
Unit: 1 Unit: 2 Unit: 3	<u>ts:</u>	System Embed Microc Compa Assemt Instruc Optimi Embed Variabl Files Real-tin	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang tion Se zation Te ded C es, and 0 me Ope	Embedd Eecture o Eems rs and rs; Archit tween M guage P guage P et Archi echnique Program Operator	led Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I rs; Contr Systems	ems: Defi ided Syste oprocesse and Memo crollers an ning: Int (ISA); I ntroducti rol Struct (RTOS):	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em	aracteristi onents of oduction zation; Int ocessors to Asse ng Tech bedded unctions;	to erfacin mbly I niques C Pro Standa Real-tin	Microcc g with Pe Language and E grammin ard Libra	Syster ontrol eriphe e Pro xamp g; Da ries a ries a	n; Types o lers and gramming les; Code ata Types nd Heade
Unit: 1 Unit: 2 Unit: 3 Unit: 4		System Embed Microc Compa Assemt Instruc Optimi Embed Variabl Files Real-tin Schedu	iction to is; Archit ded Syst ontroller rocessor rison be oly Lang tion Se zation Te ded C es, and 0 me Ope lling Alg	Embeda cecture o cems rs and rs; Archit tween M guage P guage P et Archi echnique Program Operator corithms;	led Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I rs; Contr Systems	ems: Defi ided Syste oprocesse and Memo crollers an ning: Int (ISA); I ntroducti rol Struct (RTOS):	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em ures and F Introduct	aracteristi onents of oduction zation; Int ocessors to Asse ng Tech bedded unctions;	to erfacin mbly I niques C Pro Standa Real-tin	Microcc g with Pe Language and E grammin ard Libra	Syster ontrol eriphe e Pro xamp g; Da ries a ries a	n; Types c lers and gramming les; Cod ata Types nd Heade
Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 <b>Examination an</b> exams/ assignm	d Evalua	System Embed Microc Compa Assemt Instruc Optimi Embed Variabl Files Real-tin Schedu Timing tion Pat	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang tion Se zation Tr ded C es, and 0 me Ope lling Alg Analysis tern: It	Embedd Eecture o Eems rs and rs; Archit tween M guage P et Archi echnique Program Operator erating S corithms; s include	ded Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I rs; Contr Systems Task M both int	ems: Defi Ided Syste oprocesso and Memo crollers ar ning: Int (ISA); F ntroducti rol Struct (RTOS): (RTOS): Manageme	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em ures and F Introduct ent and Sy	aracteristi onents of oduction zation; Int <u>ocessors</u> to Asse ng Tech bedded unctions; cion to E ynchroniz	to erfacin mbly I niques C Pro Standa Real-tin ation; compr	Microcc g with Pe anguage and E grammin ard Libra ne Oper Interrup	Syster ontrol eriphe e Pro xamp g; Da ries a rating t Han o clas	n; Types c lers and gramming les; Cod ata Types nd Heade Systems adling and s sessiona
Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 <b>Examination an</b> exams/ assignm examination.	d Evalua	System Embed Microc Compa Assemt Instruc Optimi Embed Variabl Files Real-tin Schedu Timing tion Pat	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang tion Se zation Tr ded C es, and 0 me Ope lling Alg Analysis t <b>tern:</b> It	Embedd Eecture o Eems rs and rs; Archit tween M guage P et Archi echnique Program Operator erating S corithms; s include	ded Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I rs; Contr Systems Task M both int	ems: Defi Ided Syste oprocesso and Memo crollers ar ning: Int (ISA); F ntroducti rol Struct (RTOS): (RTOS): Manageme	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em ures and F Introduct ent and Sy	aracteristi onents of oduction zation; Int <u>ocessors</u> to Asse ng Tech bedded unctions; cion to E ynchroniz	to erfacin mbly I niques C Pro Standa Real-tin ation; compr	Microcc g with Pe anguage and E grammin ard Libra ne Oper Interrup	Syster ontrol eriphe e Pro xamp g; Da ries a rating t Han o clas	n; Types c lers and gramming les; Cod ata Types nd Heade Systems adling and s sessiona
Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination an exams/ assignm examination. Text Books:	<b>d Evalua</b> ents/ qu	System Embed Microc Oompa Assemt Instruc Optimi Embed Variabl Files Real-tin Schedu Timing tion Pat iz/ semi	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang tion Se zation Te ded C es, and 0 me Ope lling Alg Analysis ctern: It	Embedd Eacture o Eacture o	led Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I s; Contr Systems Task M both int etc. and	ems: Defi lded Syste oprocesso and Memo crollers an ning: Int (ISA); F ntroducti ol Struct (RTOS): Managemo ternal eva l external	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em ures and F Introduct ent and Sy aluation (30 evaluation	aracteristi onents of oduction zation; Int ocessors to Asse ng Tech bedded unctions; cion to 1 ynchroniz	an Em to erfacin mbly 1 niques C Pro Standa Real-tin ation; compr s) whic	bedded S Microcc g with Pe and E grammin ard Libra ne Oper Interrup ising two h is main	Syster ontrol eriphe e Pro xamp g; Da ries a ries a rating t Han o clas ily en	n; Types of lers and gramming les; Cod ata Types nd Heade Systems ndling and s sessiona d semeste
Unit: 1 Unit: 2 Unit: 3 Unit: 3 Unit: 4 Unit: 5 Examination an exams/ assignm examination. Text Books: 1 Embedded	<b>d Evalua</b> ents/ qu l Systems	System Embed Microc Compa Assemt Instruc Optimi Embed Variabl Files Real-tin Schedu Timing tion Pat iz/ semi	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang tion Se zation Te ded C es, and 0 me Ope lling Alg Analysis tern: It inar pres	Embedd Eccture o Eccture o	led Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I s; Contr Systems Task M both int etc. and ystems for	ems: Defi ided Syste oprocesso and Memo crollers an ning: Int (ISA); I ntroducti rol Struct (RTOS): Manageme ternal eva l external or Arm Co	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em ures and F Introduct ent and Sy iluation (30 evaluation	aracteristi onents of oduction zation; Int ocessors to Asse ng Tech bedded unctions; ion to 1 ynchroniz 0 marks) (70 marks) crocontro	an Em to erfacin mbly I niques C Pro Standa Real-tin ation; compr s) whic	bedded S Microcc g with Pe Language and E grammin ard Libra ne Open Interrup ising two h is main	Syster ontrol eriphe e Pro xamp g; Da ries a ries a rating t Han o clas ily en	n; Types of lers and gramming les; Cod ata Types nd Heade Systems ndling and s sessiona d semeste
Unit: 1 Unit: 2 Unit: 3 Unit: 3 Unit: 4 Unit: 5 Examination an exams/ assignm examination. Text Books: 1 Embeddec 2 Embeddec	<b>d Evalua</b> ents/ qu 1 Systems	System Embed Microc Compa Assemt Instruc Optimi Embed Variabl Files Real-tin Schedu Timing tion Pat iz/ semi	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang tion Se zation Te ded C es, and 0 me Ope lling Alg Analysis tern: It inar pres	Embedd Eccture o Eccture o	led Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I s; Contr Systems Task M both int etc. and ystems for	ems: Defi ided Syste oprocesso and Memo crollers an ning: Int (ISA); I ntroducti rol Struct (RTOS): Manageme ternal eva l external or Arm Co	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em ures and F Introduct ent and Sy aluation (30 evaluation	aracteristi onents of oduction zation; Int ocessors to Asse ng Tech bedded unctions; ion to 1 ynchroniz 0 marks) (70 marks) crocontro	an Em to erfacin mbly I niques C Pro Standa Real-tin ation; compr s) whic	bedded S Microcc g with Pe Language and E grammin ard Libra ne Open Interrup ising two h is main	Syster ontrol eriphe e Pro xamp g; Da ries a ries a rating t Han o clas ily en	n; Types o lers an gramming les; Cod ata Types nd Heade Systems ndling an s sessiona d semeste
Unit: 1 Unit: 2 Unit: 3 Unit: 3 Unit: 4 Unit: 5 Examination an exams/ assignm examination. Text Books: 1 Embeddec 2 Embeddec Reference Books	<b>d Evalua</b> ents/ qu l Systems l Systems <b>s</b> :	System Embed Microc Compa Assemt Instruc Optimi Embed Variabl Files Real-tin Schedu Timing tion Pat iz/ semi s: Real-T	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang tion Se zation Tr ded C es, and 0 me Ope aling Alg Analysis tern: It inar pres	Embedd Eccture o Eccture o	led Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I rs; Contr Systems Task M both int etc. and ystems for rtex-M I	ems: Defi lded Syste oprocesso and Memo crollers ar ning: Int (ISA); F ntroducti rol Struct (RTOS): (RTOS): (RTOS): (RTOS): danageme ternal eva l external or Arm Co	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em ures and F Introduct ent and Sy iluation (30 evaluation	aracteristi onents of oduction zation; Int <u>ocessors</u> to Asse ng Tech bedded unctions; ion to D ynchroniz 0 marks) (70 mark	an Em to erfacin mbly I niques C Pro Standa Real-tin ation; ation; s) whic llers" b W. Val	bedded S Microco g with Pe Language and E grammin ard Libra me Open Interrup ising two h is main y Jonatha vano	Syster ontrol eriphe e Pro xamp g; D: ries a rating t Han o clas ily end	n; Types c lers and gramming les; Cod ata Types nd Heade c Systems ndling and s sessiona d semeste Valvano
Unit: 1 Unit: 2 Unit: 3 Unit: 3 Unit: 4 Unit: 5 Examination an exams/ assignm examination. Text Books: 1 Embeddec 2 Embeddec Reference Book	<b>d Evalua</b> ents/ qu l Systems l Systems <b>s</b> :	System Embed Microc Compa Assemt Instruc Optimi Embed Variabl Files Real-tin Schedu Timing tion Pat iz/ semi s: Real-T	iction to is; Archit ded Syst ontroller rocesson rison be oly Lang tion Se zation Tr ded C es, and 0 me Ope aling Alg Analysis tern: It inar pres	Embedd Eccture o Eccture o	led Syst f Embed Micr cecture a icrocont rogramm tecture es ming: I rs; Contr Systems Task M both int etc. and ystems for rtex-M I	ems: Defi lded Syste oprocesso and Memo crollers ar ning: Int (ISA); F ntroducti rol Struct (RTOS): (RTOS): (RTOS): (RTOS): danageme ternal eva l external or Arm Co	nition, Cha ems; Comp ors: Intro ory Organiz ad Micropro roduction Programmi on to Em ures and F Introduct ent and Sy iluation (30 evaluation	aracteristi onents of oduction zation; Int <u>ocessors</u> to Asse ng Tech bedded unctions; ion to D ynchroniz 0 marks) (70 mark	an Em to erfacin mbly I niques C Pro Standa Real-tin ation; ation; s) whic llers" b W. Val	bedded S Microco g with Pe Language and E grammin ard Libra me Open Interrup ising two h is main y Jonatha vano	Syster ontrol eriphe e Pro xamp g; D: ries a rating t Han o clas ily end	n; Types of lers an gramming les; Cod ata Types nd Heade c Systems ndling an s sessiona d semeste Valvano

No. of P Periods/	<b>cheme c</b> Periods ' Week		Date				Course TitleLectAdvanced Wireless & Mobile NetworksLDate of Approval: 16th BoS 17-11-20224							
So No. of P Periods/ C Instruction Prerequisite(s): Con Course Objectives:	Periods ' Week			<u></u>			1-2022	0 0						
No. of P Periods/ C Instruction Prerequisite(s): Con Course Objectives:	Periods ' Week		of Instruction Scheme of Exam								-			
Periods/ C Instruction Prerequisite(s): Con Course Objectives:	'Week	: 60 Hrs. Maximu : 4 Internal Ev:									-	100		
C Instruction Prerequisite(s): Con Course Objectives:									rnal Eva			30		
Instruction Prerequisite(s): Con Course Objectives:	Juno	: 4								emeste		70		
Course Objectives:		: Leo	ture						Exam D			3 Hrs		
	nputer l	Network	ing & Wi	reless Co	ommunio	cation					•			
. To Understand t														
<ol> <li>To acquaint with</li> <li>To analyze and a</li> <li>To demonstrate</li> </ol>	h key co design v e the app	oncepts various r	of wirele nedium a	ss netwo				0	eir basi	c opera	itions.			
Course Outcomes (CO):														
COs No. Statement								0	utcome	· /				
u		nd vario				ng and w works, sta				]	PO <sub>1</sub> , PO	2, <b>PO</b> 6		
			gn WLAN perform			, Cellular	based up	oon unde	r lying	PO	1, <b>PO</b> 3, I	PO4, PO9		
		nd Desi wireless		ess netv	vorks ex	ploring ti	rade-offs	betweer	n wire	F	PO3, PO4	, <b>PO</b> 10		
	nalyze a roblems		elop mo	oile appl	ications	to solve	some of	the real-	world	I	PO <sub>3</sub> , PO	5, <b>PO</b> 12		
or team work, <b>PO</b> <sub>10</sub> - Co		I	Mappin	g of cour	se outco	mes with	progran	n outcom	es	DO	DO			
Course Outcomes CO <sub>1</sub>	<b>PO</b> <sub>1</sub>	<b>PO</b> <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	<b>PO</b> <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO	1 <b>PO</b> 1		
	2	1	1	2		2			2					
CO <sub>3</sub>	<u> </u>		1	2						2				
CO4			2		2							1		
			1 – R	easonabl	e; 2 – Sia	nificant;	3 - Stroi	ıq	1		I			
Detailed Contents:					, .	/ /		5						
Unit: 1		Access reuse, poorne Physic & prot	Techno Radio I ess, Band al & MAC ocols, Int m, Prob	logies – Propagat width, e Clayer, 8 Trastruct	CDMA, 1 ion and nergy et 802.11 MA ure vs. A	ing Trend FDMA, TI Modellir c. Wireles AC Modes dhoc Modes ects in In	DMA, Sp ng, Chall ss Local A s (DCF & des, Hidd	read Spe enges in area Netw PCF) IEE len Node	ctrum Mobil vorks: II E 802.11 & Expo	techno e Com EEE 802 I standa osed Te	logies, puting: 2.11 Wir ards, Ar rminal	Frequence Resource eless LAN chitectur		
Unit: 2		Wirele over V strateg	ss Cellul Vireless gies, Han	Networ doff stra	ks, Cellu Itegies, I	and 2G, ilar archi nterferen ead spect	itecture, ice and s	Frequen ystem ca	cy reu pacity,	se, Ch	annel a	ssignme		
Unit: 3		WiMA Wirele Wirele	K (Physio ss Regio ss Sensc	cal layer nal Area or Netwo	, Media Networ orks: Intr	access of rks, IEEE roduction OS Over	control, 802.21 a, Applica	Mobility Media In	and N depend	ent Ha	ndover	Overvie		
Unit: 4		Wirele in wire	ss PANs:	Bluetoo works V	th AND Z	Zigbee, In lities, Sec	troductio							
Unit: 5			ced Topi rks, Opp			nd IEEE 8 rks.	302.11i sta	andards, I	Introdu	ction to	o Vehic	ılar Adh		

exan	nination.
Text	Books:
1	Schiller J., Mobile Communications, Addison Wesley 2000.
2	Stallings W., Wireless Communications and Networks, Pearson Education 2005.
Refe	rence Books:
1	Stojmenic Ivan, Handbook of Wireless Networks and Mobile Computing, John Wiley and Sons Inc 2002.
2	Yi Bing Lin and Imrich Chlamtac, Wireless and Mobile Network Architectures, John Wiley and Sons Inc 2000.

	ode				Course 7				Leo	ture			
MTCS465	PET				oft Comp				L	T P	Sem	ester: IV	
Version: 1.2				e of App	<b>roval:</b> 16t	h BoS 17-			3	1 0			
	Scheme	г т					S	cheme o			, , , , , , , , , , , , , , , , , , ,	40.0	
	of Periods		Hrs.							n Score	:	100	
Perio	ls/Week	: 4						Inte		aluation	:	30	
Instruct	Credits	: 4	otuno							emester		70 2 Uma	
Prerequisite(s)	ion Mode		cture	D					Exam L	uration	:	3 Hrs.	
Course Object		Learning	g, MATLP	4D									
1. To introdu		nnuting	concept	s and te	chniques	and fost	er their abi	lities in d	lesionir	or appro	priate t	echnique	
for a given		npuung	concept	s and te	ennques		er then ub	nues m	acoigiin	ig uppi of		cennque	
0		mputing	-based s	olutions	for real-	world pr	oblems.						
<ol> <li>To implement soft computing-based solutions for real-world problems.</li> <li>To provide knowledge of non-traditional technologies and fundamentals of artificial neur</li> </ol>							ral netw	orks, fi	uzzy sets,				
fuzzy logic, genetic algorithms.										·			
4. To provide	student ha	ands-on	experier	nce on M	IATLAB t	o implem	ent various	strategi	es.				
<b>Course Outcom</b>	nes (CO):												
COs No.					Statem	ent						Program	
		0				1 .1 .						es (POs)	
CO <sub>1</sub>			omputing	g techni	ques an	d their 1	oles in bu	ulding ii	ntellige	nt	$PO_2$ ,	PO4	
	machine:		and rece	oningt	hondle	uncertain	tr and act-	2		-	0 00		
$CO_2$	Apply fuz				5 nandle	uncertair	nty and solv	e			$\mathbf{O}_1, \mathbf{PO}$	3, <b>PO</b> 4	
CO <sub>3</sub>					inatorial	ontimiza	tion proble	ms		P	<b>Դ∘ Þ</b> Ω	3, <b>PO</b> 4,	
003	rippiy ge	lietie alg	oriennis	to comb	matorial	optimiza	cion proble				PO		
CO <sub>4</sub>	Evaluate	and con	mpare so	olutions	by vario	us soft o	computing	approach	hes for	а	<b>PO</b> <sub>2</sub> ,		
	given pro		1		5		1 0	11					
		Communication, <b>PO</b> <sub>11</sub> - Project management and finance, <b>PO</b> <sub>12</sub> - Life-long Learning Mapping of course outcomes with program outcomes											
Course	PO	PO		Ŭ	ourse out	comes wi	ith progran	n outcom	les	PO	PO	POn	
Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	Mappi <b>PO</b> 3	PO <sub>4</sub>						PO <sub>10</sub>	PO <sub>11</sub>	PO <sub>12</sub>	
Outcomes CO <sub>1</sub>		<b>PO</b> <sub>2</sub>	PO <sub>3</sub>	<b>PO</b> <sub>4</sub>	ourse out	comes wi	ith progran	n outcom	les	PO <sub>10</sub>	PO <sub>11</sub>	PO <sub>12</sub>	
Outcomes CO <sub>1</sub> CO <sub>2</sub>	<b>PO</b> <sub>1</sub>	1	<b>PO</b> <sub>3</sub>	<b>PO</b> <sub>4</sub> 3 2	ourse out	comes wi	ith progran	n outcom	les	PO <sub>10</sub>	PO <sub>11</sub>		
OutcomesCO1CO2CO3		1	PO <sub>3</sub>	<b>PO</b> <sub>4</sub> 3 2 2	ourse out	comes wi	ith progran	n outcom	les	PO <sub>10</sub>	PO <sub>11</sub>	<b>PO</b> <sub>12</sub>	
Outcomes CO <sub>1</sub> CO <sub>2</sub>		1	<b>PO</b> <sub>3</sub>	<b>PO</b> <sub>4</sub> 3 2 2 3	PO5	PO <sub>6</sub>	PO7	PO <sub>8</sub>	les	PO <sub>10</sub>	PO <sub>11</sub>		
Outcomes           CO1           CO2           CO3           CO4	3	1	<b>PO</b> <sub>3</sub>	<b>PO</b> <sub>4</sub> 3 2 2 3	PO5	PO <sub>6</sub>	ith progran	PO <sub>8</sub>	les	PO <sub>10</sub>	PO <sub>11</sub>		
OutcomesCO1CO2CO3	3	1 3 3	PO <sub>3</sub> 3 2 1 -	PO <sub>4</sub> 3 2 2 3 Reasona	PO5 PO5 able; 2 – S	PO <sub>6</sub> PO <sub>6</sub> Significan	PO7 PO7 t; 3 – Stror	PO <sub>8</sub>	PO <sub>9</sub>			2	
Outcomes           CO1           CO2           CO3           CO4	a a a a a a a a a a a a a a a a a a a	1 3 3 Introc Soft	<b>PO</b> <sub>3</sub> 3 2 1- <b>luction</b> Compu	<b>PO</b> <sub>4</sub> 3 2 2 3 <b>Reasona</b> <b>to Sof</b>	PO5 PO5 able; 2 – S t Comp Constitu	comes wi PO <sub>6</sub> Significan uting ar ents, F	th program PO7 tt; 3 - Stron d Neural	PO <sub>8</sub> PO <sub>8</sub>	PO <sub>9</sub>	blution	of Cor	2 mputing:	
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conte	a a a a a a a a a a a a a a a a a a a	1 3 3 Introd Soft Intelli	PO <sub>3</sub> 3 2 1- duction Compu gence: 1	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin	PO5 PO5 Ible; 2 – S t Comp Constitu eLearni	comes wi PO <sub>6</sub> Significan uting ar ents, F ng Basic	th program PO7 tt; 3 - Stron d Neural	PO <sub>8</sub> PO <sub>8</sub> PO <sub>8</sub> Netwo nventio	PO9 PO9 rk: Evo nal A	blution of I to (	of Cor Compu	2 mputing: itational	
Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Conte	3 ents:	1 3 3 Introo Soft Intelli <b>Fuzzy</b> Funct	PO <sub>3</sub> 3 2 1- duction Compu gence: 1 Logic: 1 ions: Fu	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy Suzzy Ru	PO5 PO5 able; 2 – S t Comp Constitu eLearni Gets, Op iles and	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy	th program PO7 tt; 3 – Stron d Neural From Co ss. on Fuzzy Reasonin	PO <sub>8</sub> PO <sub>8</sub> Netwo Netwo v Sets, F	rk: Evo nal A	olution of I to C	of Cor Compu	2 nputing: itational	
Outcomes CO1 CO2 CO3 CO4 Detailed Conte	3 ents:	1 3 3 Introd Soft Intelli Fuzzy Funct Exper	PO <sub>3</sub> 3 2 1- duction Compu gence: 1 Logic: 1 ions: Fu	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy S Izzy Ru ns, Fuz	PO5 PO5 able; 2 – 5 t Comp Constitu eLearni Sets, Op iles and zy Decis	comes wi PO6 Significan uting ar lents, F ng Basic erations Fuzzy sion Mal	th program PO7 et; 3 – Stror d Neural From Co S. s on Fuzzy Reasoning king.	PO <sub>8</sub> PO <sub>8</sub> Netwo Netwo Sets, F g, Fuzzy	rk: Evo nal A uzzy R y Infer	olution of I to ( elations rence Systems	of Cor Compu s, Mem ystem	nputing: itational bership s, Fuzzy	
Outcomes CO1 CO2 CO3 CO4 Detailed Conte	3 ents:	1 3 3 Introd Soft Intelli Fuzzy Funct Exper Neura	PO <sub>3</sub> 3 2 1- duction Compu gence: 1 Logic: 1 ions: Fu t Syster al Netwo	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy S izzy Ru ns, Fuz orks: M	PO5 PO5 able; 2 - S t Comp Constitu eLearni Sets, Op iles and zy Decis fachine	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin	th program PO7 PO7 tt; 3 – Stror d Neural From Co cs. con Fuzzy Reasoning cing. g Using N	PO <sub>8</sub> PO <sub>8</sub> Netwo nvention y Sets, F g, Fuzzy feural N	rk: Evo nal A uzzy R y Infer	olution I to C elations rence S k, Adapt	of Cor Compu s, Men ystems	2 mputing: itational hbership s, Fuzzy etworks,	
Outcomes CO1 CO2 CO3 CO4 Detailed Conte	2	1 3 3 Introd Soft Intelli Fuzzy Funct Exper Neura Feed	PO <sub>3</sub> 3 2 1- duction Compu gence: 1 Logic: 1 ions: Fu tons: Fu tons: Fu tons: Fu tons: Fu	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy S uzzy Ru ns, Fuz orks: M d Netw	PO5 PO5 able; 2 - S t Comp Constitu eLearni Gets, Op iles and zy Decis fachine yorks, S	comes wi PO6 Significan uting an ents, F ng Basic erations Fuzzy sion Mal Learnin Supervise	th program PO7 PO7 tt; 3 – Stron d Neural From Co es. con Fuzzy Reasoning cing. g Using N ed Learni	PO <sub>8</sub> PO <sub>8</sub> Netwo Netwo Sets, F g, Fuzzy feural N ng Neu	rk: Evo nal A uzzy R y Infer etwor	olution I to C elations rence Sy k, Adapt etworks	of Cor Compu s, Men ystem tive Ne	nputing: ntational bership s, Fuzzy etworks, ial Basis	
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 2	2	1 3 3 <b>Intro</b> Soft Intelli <b>Fuzzy</b> Funct Exper <b>Neura</b> Feed Funct	PO <sub>3</sub> 3 2 1- duction Compu gence: 1 Logic: 1 ions: Fu t Syster ol Netwo forward ion Netwo	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy S Izzy Ru ns, Fuz orks: N d Netw tworks:	PO5 PO5 able; 2 – S t Comp Constitu eLearni Sets, Op iles and zy Decis fachine vorks, S : Reinfo	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin Superviso rcemen	th program PO7 PO7 tt; 3 - Stron d Neural brom Co es. on Fuzzy Reasoning king. g Using N ed Learnin t Learnin	Netwo r Sets, F g, Fuzzy feural N ng Neu g, Unst	rk: Evo nal A uzzy R utzy R v Infer retwori ural Nu upervis	blution of I to C elations rence S k, Adapt etworks sed Lea	of Cor Compu s, Men system tive Ne , Radiarning	2 nputing: ntational nbership s, Fuzzy etworks, ial Basis Neural	
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 2	2	1 3 3 <b>Intro</b> Soft Intelli <b>Fuzzy</b> Funct Exper <b>Neura</b> Feed Funct Netwo	PO <sub>3</sub> 3 2 1- duction Compu gence: 1 Logic: 1 Logic: 1 ions: Fu t Syster of Netwo forward ion Net porks, Ad	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy Suzzy Ru ns, Fuz orks: N d Netw tworks: aptive	PO5 PO5 able; 2 – S t Comp Constitu eLearni Sets, Op iles and zy Decis fachine vorks, S : Reinfo Resonar	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin Supervise rcementance arch	th program PO7 PO7 tt; 3 - Stron d Neural From Co cs. on Fuzzy Reasoning cing. g Using N ed Learnin t Learnin itectures,	PO <sub>8</sub> PO <sub>8</sub> Netwo Netwo Netwo Sets, F g, Fuzzy feural N ng Neu g, Uns Advanc	rk: Evo nal A uzzy R uzzy R uzzy R uzzy R uzzy R	olution of I to ( elations ence S ence S etworks sed Lea Neural r	of Cor Compu s, Men systems cive Ne , Radi arning networ	2 nputing: ntational hbership s, Fuzzy etworks, ial Basis Neural ks.	
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 2	2	1 3 3 Introd Soft Intelli Fuzzy Funct Exper Neura Feed Funct Netwo Genet	PO <sub>3</sub> 3 2 1- duction Compu gence: 1 Logic: 1 ions: Fu t Syster forward forward forward forward ion Net prks, Ad	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy Su zzy Ru ns, Fuz orks: M d Netw tworks: aptive rithms	PO5 PO5 PO5 able; 2 – S t Comp Constitu eLearni Sets, Op iles and zy Decis fachine vorks, S c Reinfo Resonar i Introdu	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin Supervise rcement nce arch uction to	th program PO7 PO7 tt; 3 - Stron d Neural From Co es. on Fuzzy Reasoning cing. g Using N ed Learnin t Learnin itectures, o Genetic	PO <sub>8</sub> PO <sub>8</sub> Netwo nvention Sets, F g, Fuzzy feural N ng Neu g, Unst Advanc Algorith	rk: Evo nal A uzzy R uzzy R uzzy R uzzy R uzzy R uzzy R uzzy R	blution of elations rence Sy k, Adapt etworks sed Lea <u>Neural r</u> A), Appl	of Cor Compu s, Men ystem cive Ne , Radi arning networ licatio	2 nputing: itational hbership s, Fuzzy etworks, ial Basis Neural ks. ns of GA	
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: 1 Unit: 1	2 3 4	1 3 3 Introd Soft Intelli Fuzzy Funct Exper Neura Feed Funct Netwo Genet in Maa Recen	PO <sub>3</sub> 3 2 1- duction Compu gence: I Logic: I tons: Fu tons: Fu tons: Fu tons: Fu tons: Ad cic Algo chine Le t Trend	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy Suzzy Ru ns, Fuz orks: M d Netw tworks: aptive rithms carning:	PO5 PO5 PO5 able; 2 – S t Comp Constitu eLearni Sets, Op des and zy Decis fachine vorks, S c Reinfo Resonar i Introdi Machine p learn	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin Supervise rcement nce arch uction to ne Learnin ing, vari	th program PO7 PO7 tt; 3 - Stron d Neural rom Co cs. on Fuzzy Reasoning cing. g Using N ed Learnin itectures, o Genetic ing Appro ous classi	PO <sup>®</sup> PO <sup>®</sup> Netwo nvention Sets, F g, Fuzzy feural N ng Neu g, Unst Advance Algorith bach to fiers, ne	rk: Evo nal A uzzy R y Infer etwori ural No upervis ces in N nms (G Knowle	plution I to ( elations ence S ence S k, Adapt etworks sed Lea Neural n A), Appl edge Ac etworks	of Cor Compu s, Men ystems cive No , Radi arning aetwor licatio quisiti and g	2 nputing: ntational nbership s, Fuzzy etworks, ial Basis Neural ks. ns of GA ion. renetic	
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 1 Unit: 2 Unit: 2 Unit: 2	2 3 4 5	1 3 3 Introd Soft Intelli Fuzzy Funct Exper Neura Feed Funct Netwo Genet in Maa Recen algori	PO <sub>3</sub> 3 2 1- duction Compu gence: 1 Logic: 1 Logic: 1 ions: Fu t Syster l Network forward forward ion Net orks, Ad cic Algo chine Le thm. Im	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy S zzy Ru ns, Fuz orks: M d Netw tworks: aptive rithms: anning s in dec plemer	PO5 PO5 able; 2 – S t Comp Constitu eLearni Sets, Op iles and zy Decis fachine vorks, S c Reinfo Resonar : Introdu : Machine p learn ntation of	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin Supervise rcement nce arch uction to ne Learn ing, vari of recen	th program PO7 PO7 tt; 3 – Stron d Neural rom Co cs. con Fuzzy Reasoning cing. g Using N ed Learnin itectures, o Genetic ing Appro ous classi tly propos	PO <sub>8</sub> PO <sub>8</sub> Netwo Netwo Netwo Sets, F g, Fuzzy feural N ng Neu g, Unst Advance Algorith bach to fiers, ne sed soft	rk: Evo nal A uzzy R y Infer ietwori ietwori ices in N ams (G Knowle eural ne compt	plution I to C elations rence S k, Adapt etworks sed Lea Neural r A), Appl edge Ac etworks iting te	of Cor Compu s, Men ystems cive No , Radi arning aetwor licatio quisiti and g chniqu	2 mputing: utational bership s, Fuzzy etworks, ial Basis Neural ks. ns of GA ion. genetic ues.	
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: 1 Unit: 1 Unit: 2 Unit: 2 Un	2 and Evalua	1 3 3 Introd Soft Intelli Fuzzy Funct Exper Neura Feed Funct Netwo Genet in Mao Recen algori tion Pat	PO <sub>3</sub> 3 2 1- duction Compu gence: I Logic: I ions: Fu t Syster lorks, Ad torks, Ad tic Algo chine Le thm. Im ttern: It	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy S Izzy Ru ns, Fuz orks: N d Netw tworks: aptive f sin dec plemer include	PO5 PO5 PO5 able; 2 - S t Comp Constitu eLearni Sets, Op iles and zy Decis fachine vorks, S : Reinfo Resonar : Introdu : Machine p learn ntation of both int	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin Supervise rcement ince arch uction to ne Learn ing, vari of recen- cernal eva	th program PO7 PO7 tt; 3 – Stror d Neural From Co S. Gon Fuzzy Reasoning cing. g Using N ed Learnin itectures, o Genetic ing Appro ous classi tly propos iluation (30	PO <sup>®</sup> PO <sup>®</sup> Netwo Netwo Netwo Sets, F g, Fuzzy Geural N ng Neu g, Unsy Advanc Algorith bach to fiers, ne sed soft O marks)	rk: Evo rk: Evo nal A uzzy R y Infer iral Ne upervis ces in N nms (G Knowl- compt compt compt	plution l to ( elations rence S k, Adapt etworks sed Lea Neural r A), Appl edge Ac etworks ating te- ising two	of Cor Compu s, Men ystems cive No , Radi arning atwor licatio quisiti and g chniqu o class	2 nputing: atational abership s, Fuzzy etworks, ial Basis Neural ks. ns of GA ion. enetic as. sessional	
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1 Unit: 1 Unit: 1	2 and Evalua	1 3 3 Introd Soft Intelli Fuzzy Funct Exper Neura Feed Funct Netwo Genet in Mao Recen algori tion Pat	PO <sub>3</sub> 3 2 1- duction Compu gence: I Logic: I ions: Fu t Syster lorks, Ad torks, Ad tic Algo chine Le thm. Im ttern: It	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy S Izzy Ru ns, Fuz orks: N d Netw tworks: aptive f sin dec plemer include	PO5 PO5 PO5 able; 2 - S t Comp Constitu eLearni Sets, Op iles and zy Decis fachine vorks, S : Reinfo Resonar : Introdu : Machine p learn ntation of both int	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin Supervise rcement ince arch uction to ne Learn ing, vari of recen- cernal eva	th program PO7 PO7 tt; 3 – Stror d Neural From Co S. Gon Fuzzy Reasoning cing. g Using N ed Learnin itectures, o Genetic ing Appro ous classi tly propos iluation (30	PO <sup>®</sup> PO <sup>®</sup> Netwo Netwo Netwo Sets, F g, Fuzzy Geural N ng Neu g, Unsy Advanc Algorith bach to fiers, ne sed soft O marks)	rk: Evo rk: Evo nal A uzzy R y Infer iral Ne upervis ces in N nms (G Knowl- compt compt compt	plution l to ( elations rence S k, Adapt etworks sed Lea Neural r A), Appl edge Ac etworks ating te- ising two	of Cor Compu s, Men ystems cive No , Radi arning atwor licatio quisiti and g chniqu o class	2 nputing: itational bership s, Fuzzy etworks, ial Basis Neural ks. ns of GA ion. enetic ies. sessional	
Outcomes CO1 CO2 CO3 CO4 Detailed Conto Unit: 1 Unit: 1 Unit: 2 Unit: 2 Unit: 2 Examination a exams/ assign	2 and Evalua	1 3 3 Introd Soft Intelli Fuzzy Funct Exper Neura Feed Funct Netwo Genet in Mao Recen algori tion Pat	PO <sub>3</sub> 3 2 1- duction Compu gence: I Logic: I ions: Fu t Syster lorks, Ad torks, Ad tic Algo chine Le thm. Im ttern: It	PO <sub>4</sub> 3 2 3 Reasona to Soft ting C Machin Fuzzy S Izzy Ru ns, Fuz orks: N d Netw tworks: aptive f sin dec plemer include	PO5 PO5 PO5 able; 2 - S t Comp Constitu eLearni Sets, Op iles and zy Decis fachine vorks, S : Reinfo Resonar : Introdu : Machine p learn ntation of both int	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin Supervise rcement ince arch uction to ne Learn ing, vari of recen- cernal eva	th program PO7 PO7 tt; 3 – Stror d Neural From Co S. Gon Fuzzy Reasoning cing. g Using N ed Learnin itectures, o Genetic ing Appro ous classi tly propos iluation (30	PO <sup>®</sup> PO <sup>®</sup> Netwo Netwo Netwo Sets, F g, Fuzzy Geural N ng Neu g, Unsy Advanc Algorith bach to fiers, ne sed soft O marks)	rk: Evo rk: Evo nal A uzzy R y Infer iral Ne upervis ces in N nms (G Knowl- compt compt compt	plution l to ( elations rence S k, Adapt etworks sed Lea Neural r A), Appl edge Ac etworks ating te- ising two	of Cor Compu s, Men ystems cive No , Radi arning atwor licatio quisiti and g chniqu o class	2 nputing: itational bership s, Fuzzy etworks, ial Basis Neural ks. ns of GA ion. enetic ies. sessional	
Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 2 Unit: 2 Unit: 2 Unit: 2 Examination a exams/ assign examination. Text Books:	and Evalua ments/ qu	1 3 3 <b>Introd</b> Soft Intelli <b>Fuzzy</b> Funct Exper <b>Neura</b> Feed Funct Netwo <b>Genet</b> in Maa Recen algori tion Pat	PO <sub>3</sub> 3 2 duction Compu gence: I Logic: I t Syster orks, Ad tic Algo chine Le thm. Im ttern: It inar pres	PO <sub>4</sub> 3 2 2 3 Reasona to Soft ting C Machin Fuzzy Suzzy Ru ns, Fuz orks: N d Netw tworks: aptive rithms and dec plemer include entation	PO5 PO5 burse out PO5 ble; 2 - S t Comp Constitu eLearni Sets, Op iles and zy Decis fachine vorks, S c Reinfo Resonar : Introdu : Machine p learn ntation o both int n etc. and	comes wi PO6 Significan uting ar ents, F ng Basic erations Fuzzy sion Mal Learnin Supervise rcement ince arch uction to he Learn ing, vari of recent iernal eva l external	th program PO7 PO7 tt; 3 – Stror d Neural From Co S. Gon Fuzzy Reasoning cing. g Using N ed Learnin itectures, o Genetic ing Appro ous classi tly propos iluation (30	PO <sub>8</sub> PO <sub>8</sub> Netwo nvention Sets, F g, Fuzzy feural N ng Neu g, Unsy Advance Algorith bach to fiers, neu sed soft 0 marks) (70 mark	rk: Evo nal A uzzy R y Infer etwori upervis ces in N upervis ces in N mms (G Knowl- compr compr compr s) whic	blution of elations rence S rence S k, Adapt etworks sed Lea Neural n A), Appl edge Ac etworks iting tea ising two h is mair	of Cor Compu s, Men systems tive Ne , Radia arning arning arning icatio quisiti and g chniqu o class ily end	2 nputing: itational bership s, Fuzzy etworks, fal Basis Neural ks. ns of GA ion. enetic ies. sessional semester	

Refe	rence 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 C					Course 7	Гitle			Leo	ture		
MTAC211	PET					h Paper V			L	Т Р	Sem	ester: II
Version: 1.2				e of App	r <b>oval:</b> 16t	h BoS 17-			2	0 0		
	Scheme	I I					Ş	Scheme o				
No.	of Periods	: 30	Hrs.					Ν	/laximui	n Score	:	50
Perio	ds/ Week	: 2						Inte	rnal Eva	aluation	:	15
	Credits	: -							End Se	emester	:	35
Instruct	tion Mode	: Le	cture						Exam D	uration	:	2 Hrs.
Prerequisite(s	): Basic kno	wledge	of Englis	h								
Course Object												
<ol> <li>Understan</li> <li>Learn about</li> <li>Understan</li> </ol>	ut what to v	write in o	each sect	tion.			·		at very	first-tim	e submi	ssion.
4. Ensure the	e quality of	paper at	very firs	st-time s	ubmissic	on.						
Course Outco	mes (CO):											
COs No.					Statem	ent				Ma	pped P	rogram
										01	itcome	s (POs)
CO <sub>1</sub>	Understa	and the l	English fo	or Writin	ng Resear	ch Paper	s, Thesis.			PO	, <b>PO</b> <sub>2</sub> , <b>P</b>	O <sub>6</sub> , PO <sub>10</sub>
$CO_2$						dancy in					PO <sub>3</sub> , F	
CO <sub>3</sub>	Summari	ize, evalı	late liter	ature, ar	nd write	methodol	ogy, result	s and cor	nclusion	PO:	2, <b>PO</b> 3, <b>P</b>	O4, PO5
CO <sub>4</sub>	Apply co										PO <sub>10</sub> , F	
	appropri			0		-						
<b>PO</b> ₁- Engineerin problems, <b>PO</b> ₅- or team work, <b>P</b>	Modern tool	l usage, <b>P</b>	O₀- The € PO₁₁- Proj	ngineer a ect mana	and societ gement a	y, <b>PO</b> 7- En nd finance	vironment a	and sustair long Learn	nability, i ning			
Course												
Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO <sub>11</sub>	<b>PO</b> <sub>12</sub>
<u>CO1</u>	3	2				2				2		_
CO <sub>2</sub>			2	2	~							_
CO <sub>3</sub>		1	2	1	2							
CO <sub>4</sub>										2		1
			1 -	Reasono	ıble; 2 – S	Significan	at; 3 – Stro	ng				
Detailed Cont	ents:											
Unit:	1		ntences,				oreaking uj emoving					
Unit:	2		0		0	0 0	our Findin acts. Intro		ng and	Criticizir	ng, Para	phrasin
Unit:	3						s, Discussi		lusions,	The Fina	l Check	ζ.
							tle, key ski					
Unit:	4	key sk					troduction					
		Skills a	are need				nods, skills					
Unit:	5						n, skills are					
erne.	-		-	, how to	o ensure	e paper is	s as good	as it co	uld pos	sibly be	the fir	st- tim
	_	submis										
Examination a exams/assign												
examination.												
examination. Text Books:												
examination. Text Books: 1 Glodbor	t R (2006) V											
examination. <b>Text Books:</b> 1 Glodbor 2 Day R (2	006) How t											
examination. Text Books: 1 Glodbor 2 Day R (2 Reference Boo	006) How t oks:	to Write	and Pub	lish a Sci	entific P	aper, Can	nbridge Un	iversity F	Press.			
examination. Text Books: 1 Glodbor 2 Day R (2 Reference Boo 1 Highman	006) How t	to Write Handboo	and Pub ok of Wri	lish a Sci ting for	entific P the Math	aper, Can nematical	nbridge Un Sciences, S	iversity F SIAM. Hig	Press. ghman's			

Course Co	de				Course 7	Title			Leo	ture		
MTAC212P	ΈT			Va	lue Edu	cation			L	T P	Sen	nester: II
Version: 1.2				e of Appi	<b>roval:</b> 16t	h BoS 17-1			2	0 0		
	Scheme						S	cheme o				
	Periods		Hrs.							n Score	:	50
Period	s/Week	: 2						Inte		aluation	:	15
The set set of t	Credits	: -	4							emester	:	35
Instructio			cture						Exam L	uration	:	2 Hrs.
Prerequisite(s): Course Objectiv		ic prefet	fuisite									
1. Understand		ducation	and sel	f- develo	nment							
2. Imbibe good				i ueven	pinene							
3. Let they sho				tance of	characte	er.						
4. To teach and							eader.					
Course Outcom	es (CO):											
COs No.				9	Statemer	nt				Map	ped Pi	ogram
									comes	· /		
CO <sub>1</sub>	Knowled	ge of sel	f-develo	pment.						-		<b>O</b> <sub>8</sub> , <b>PO</b> <sub>9</sub> ,
											PO <sub>10</sub> , P	
$CO_2$	Learn the	e import	ance of I	Human \	/alues.						,	O <sub>8</sub> , PO <sub>9</sub> ,
60	Dl		11		_						$PO_{10}, P$	
CO <sub>3</sub>	Developi	ng the o	verall pe	rsonality	/.							O <sub>7</sub> , PO <sub>8</sub> ,
CO <sub>4</sub>	Coin dee	per unde	arstandir	ar about	the nur	oose of th	om lifo				9, PO <sub>10</sub>	, PO12 O7, PO8,
004	Gain ucc	per unu	li stanun	ig about	. uie pui		em me.				9, <b>PO</b> 10	
PO1- Engineering	Knowledge	, <b>PO</b> 2- Pr	oblem ana	alysis, <b>PO</b>	3- Design	/developm	nent of solut	ions, PO4-	- Condu			
problems, PO5- M	odern tool	usage, PC	<b>D</b> <sub>6</sub> - The e	ngineer a	nd societ	y, <b>PO</b> 7- Env	vironment a	nd sustair	nability,			
or team work, PO10	o- Commur	nication, <b>H</b>										
			Mappi	ng of co	urse out	comes wit	th program	outcom	es	1		
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO <sub>11</sub>	<b>PO</b> <sub>12</sub>
Outcomes CO <sub>1</sub>						3	2	2	3	3		2
			2			5	3	2	3	2		3
<u>CO3</u>			3			3	3	3	2	3		2
CO4			3			3	3	3	3	2		3
		1	_	Reasona	ble: 2 – S	ianifican	t; 3 – Stron	_	Ū	_		-
Detailed Conten	ts:				,	. <u>j</u> j	-,	J				
		Values	and sel	f-develo	pment –	Social va	lues and i	ndividual	l attitu	des. Wor	k ethi	cs, Indian
Unit: 1		vision	of huma	anism. N	Moral an	d non- i	moral valu	ation. S	tandarc	ls and p	rincip	es. Value
		judgme										
		-				ies. Sense		2	Devotio	,	elf-	reliance
Unit: 2							s Cleanline		esty, H	umanity.	Power	of faith
							e, Disciplin		ific att	tudo De	aitina	Thinking
							- Soul an ve and Kir					
Unit: 3		0		-		<b>J</b> .	herhood ar				0	
enit. o							Aware of s					
					,	ing nature						
TT-14. A							vs Blind f	aith. Self	f-manag	gement a	nd go	od health
Unit: 4				-			olence, Hui				U	
Unit: 5		Role of	f Womer	n. All re	eligions a	ind same	message.	Mind yo	our Mir	d, Self-o	control	Honesty
			ng effect				-	-				-
Examination an												
exams/ assignm	ents/ qui	z/ semi	nar prese	entation	etc. and	external	evaluation	(35 mark	ks) whic	h is mair	nly end	semester
examination.												
Text Books:		7 1	10/11	6	• .•	<b>m</b> 1	1 .	" ~ ^	1 7 7 •			D 11 -
1 Chakrobo	6	alues ar	d Ethics	tor orga	anization	s Theory	and praction	e", Oxfo	rd Univ	ersity Pr	ess, Ne	ew Delhi.
Reference Books		-+- · ·		0 J T T T	1 1							
1 https://	idp-si.ai	cte-ind	ia.org/	δαay∪H	vdov	vnioad.pl	пр					

	e	Course TitleLectPedagogy StudiesL											
MTAC213PH	ET						1.0000			T	P	Seme	ester: II
Version: 1.2	~ 1			of Appro	oval: 16tl	h BoS 17-1		~ 1	2	0	0		
	Scheme							Scheme					= 0
	Periods		Hrs.						laximu			:	50
Periods	Week	: 2						Inte	rnal Ev			:	15 35
The set was at the	Credits	: -											
Instructio			cture						Exam I	Jurati	on	:	2 Hrs.
Prerequisite(s): No Course Objectives		c prere	quisite										
<ol> <li>To Acquire know</li> <li>To understand</li> <li>To demonstration and</li> <li>To Illustrate th</li> </ol>	l the basi ate conce d learning ne critica	c view of epts rela g.	f differer ated to	nt pedago commui	ogical or nication	ientations theory -	s. • describ	e and re					
Course Outcomes	(CO):									-			
COs No.				S	tatemen	it						ped Pro	
	<b>TT</b> 1 .	1.1	1	• •		1.1	1					comes (	
	informal	classroo	oms in de	eveloping	g countri							91, <b>PO</b> 2, <b>I</b>	
CO <sub>2</sub>					tiveness	of these	pedagogi	cal practi	ices in		PO	3, PO4, I	PO <sub>6</sub>
	what cor	,		n what									
	populati				_								
CO <sub>3</sub>						d practicı					PO	7, <b>PO</b> 8, <b>I</b>	PO <sub>9</sub>
			riculum	and gui	dance r	naterials	best su	port eff	ective				
	pedagog			6.0							<u> </u>		<b>D</b> O
CO4 PO1- Engineering Kn	Evaluate					1 1	1		<u> </u>			<u>PO8, PO</u>	
or team work, <b>PO</b> 10-	Communi		<b>)</b> 11- Projec	et manage	ment and	<b>PO</b> 7- Envir l finance, <b>P</b>	ronment a <b>O</b> 12- Life-l	nd sustair ong Learn	nability, ing				ndividu
Course Outcomes	PO <sub>1</sub>	PO <sub>2</sub>	D <sub>11</sub> - Projec Mappin <b>PO</b> 3	et manage	ment and	PO7- Envi	ronment a <b>O</b> 12- Life-l	nd sustair ong Learn	nability, ing		Ethic		
Course Outcomes CO <sub>1</sub>		cation, <b>PC</b>	D <sub>11</sub> - Project Mappin <b>PO</b> <sub>3</sub> 2	et manage g of cour PO <sub>4</sub>	ment and rse outco	PO <sub>7</sub> - Envir l finance, P omes with PO <sub>6</sub>	ronment a <b>O</b> 12- Life-l 1 progran	nd sustair ong Learn n outcom	nability, ing es	<b>PO</b> 8- 1	Ethic	s, <b>PO</b> 9- I	
Course Outcomes CO <sub>1</sub> CO <sub>2</sub>	PO <sub>1</sub>	PO <sub>2</sub>	D <sub>11</sub> - Projec Mappin <b>PO</b> 3	et manage g of cour	ment and rse outco	<b>PO</b> 7- Envir l finance, <b>P</b> omes with	ronment a O <sub>12</sub> - Life- I program PO <sub>7</sub>	nd sustain ong Learn n outcom <b>PO</b> 8	nability, ing es PO <sub>9</sub>	<b>PO</b> 8- 1	Ethic	s, <b>PO</b> 9- I	
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub>	PO <sub>1</sub>	<b>PO</b> <sub>2</sub>	D <sub>11</sub> - Project Mappin <b>PO</b> <sub>3</sub> 2	et manage g of cour PO <sub>4</sub>	ment and rse outco	PO <sub>7</sub> - Envir l finance, P omes with PO <sub>6</sub>	ronment a <b>O</b> 12- Life-l 1 progran	nd sustain ong Learn n outcom PO <sub>8</sub> 2	nability, ing es PO <sub>9</sub> 2	<b>PO</b> 8- 1	Ethic	s, <b>PO</b> 9- I	PO <sub>12</sub>
Course Outcomes CO <sub>1</sub> CO <sub>2</sub>	PO <sub>1</sub>	PO <sub>2</sub>	D <sub>11</sub> - Project Mappin PO <sub>3</sub> 2 1	rt manage g of cour PO <sub>4</sub> 2	ment and rse outco PO <sub>5</sub>	PO7- Envir 1 finance, P pmes with PO6 2	Ponment a 012- Life-1 program PO7 2	nd sustair ong Learn o outcom PO <sub>8</sub> 2 2	nability, ing es PO <sub>9</sub>	<b>PO</b> 8- 1	Ethic	s, <b>PO</b> 9- I	
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	<b>PO</b> <sub>1</sub> 2	<b>PO</b> <sub>2</sub>	D <sub>11</sub> - Project Mappin PO <sub>3</sub> 2 1	rt manage g of cour PO <sub>4</sub> 2	ment and rse outco PO <sub>5</sub>	PO <sub>7</sub> - Envir l finance, P omes with PO <sub>6</sub>	Ponment a 012- Life-1 program PO7 2	nd sustair ong Learn o outcom PO <sub>8</sub> 2 2	nability, ing es PO <sub>9</sub> 2	<b>PO</b> 8- 1	Ethic	s, <b>PO</b> 9- I	PO <sub>12</sub>
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	<b>PO</b> <sub>1</sub> 2	PO2           1           2	Project           Mappin           PO3           2           1           1           1	t manage g of cour PO <sub>4</sub> 2 easonabl	ment and rse outco PO <sub>5</sub>	PO7- Énvir l finance, P Domes with PO6 2 gnificant;	ronment a O <sub>12</sub> - Life-l program PO <sub>7</sub> 2 3 - Stron	nd sustair ong Learn o outcom PO <sub>8</sub> 2 2 2 yg	ability, ing es PO <sub>9</sub> 2 2	PO <sub>8</sub> - 1	Ethic	s, <b>PO</b> <sub>9</sub> - I <b>PO</b> <sub>11</sub>	<b>PO</b> <sub>12</sub>
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub>	<b>PO</b> <sub>1</sub> 2	PO2 1 2 Introdu framev	Du- Projec Mappin PO <sub>3</sub> 2 1 1 <b>1 - R</b> uction an	t manage g of cour PO <sub>4</sub> 2 easonabl nd Metho	ment and rse outco PO <sub>5</sub> 	PO7- Envir l finance, P omes with PO6 2 gnificant; Aims an Theories	ronment a O <sub>12</sub> - Life-J program PO <sub>7</sub> 2 3 - Stron nd ratio of lea	nd sustair ong Learn n outcom PO <sub>8</sub> 2 2 2 yg nale, Pc rning, Cu	ability, ing es PO <sub>9</sub> 2 2 2 blicy t rriculu	PO <sub>8</sub> - 1 PO	Ethic ho coun	PO <sub>11</sub> PO <sub>11</sub>	PO <sub>12</sub>
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Contents Unit: 1	<b>PO</b> <sub>1</sub> 2	PO2 1 2 Introdu framev Conce	Du- Projec Mappin PO <sub>3</sub> 2 1 1 <b>1 - R</b> uction an vork an ptual fr	t manage g of cour PO4 2 easonabl nd Metho ad termir ameworl	ment and rse outco PO5 Le; 2 – Sig odology: nology: c, Resear	PO7- Envir I finance, P omes with PO6 2 gnificant; Aims ar Theories rch questi	ronment a O <sub>12</sub> - Life-] a program PO7 2 3 - Stron nd ratio of lea ons. Ove	nd sustair ong Learn n outcom PO <sub>8</sub> 2 2 2 yg nale, Pc rning, Cu rview of r	ability, ing es PO <sub>9</sub> 2 2 2 blicy t rriculu methoc	PO <sub>8</sub> - 1 PO	roun	s, PO <sub>9</sub> - I PO <sub>11</sub> d, Cor ner ed	PO <sub>12</sub> 2 nceptua ucatior ing.
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Contents	<b>PO</b> <sub>1</sub> 2	PO2 1 2 Intrody framew Conce Thema inform	Du- Project Mappin PO <sub>3</sub> 2 1 1 <b>1 - R</b> uction an vork an ptual fr. tic over al classr	t manage g of cour PO4 2 eeasonabl nd Metho and termin amework view: Peo ooms in	ment and rse outco PO <sub>5</sub> ke; 2 – Sig odology: nology: c, Resear edagogic developi	PO7- Énvir d finance, P omes with PO6 2 gnificant; Aims an Theories rch questi cal praction ng countr	a program PO <sub>12</sub> - Life-l program PO <sub>7</sub> 2 3 - Stron of lea ons. Ove ces are ries. Curr	nd sustair ong Learn n outcom PO <sub>8</sub> 2 2 2 g nale, Pc rning, Cu rview of r being us iculum, T	PO9 PO9 2 2 2 0licy t rriculu nethoc ed by 'eacher	PO <sub>8</sub> - 1 PO PO PO PO PO PO PO PO PO PO PO PO PO	Coun Coun Coun Ceacl Cand ners aatio	s, <b>PO</b> <sub>9</sub> - I <b>PO</b> <sub>11</sub> d, Cor her ed <u>l search</u> in form	PO <sub>12</sub> 2 nceptua ucatior ing. mal an
CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Contents Unit: 1	<b>PO</b> <sub>1</sub> 2	PO2 1 2 Introdu framew Conce Thema inform Eviden stage: practic pedago pedago	Du- Project Mappin PO3 2 1 1 <b>1 - R</b> uction an vork an ptual fra tic over al classr- ce on t quality a cum) an ogy? The ogical pr	t manage g of cour PO4 2 2 easonabl nd Metho nd termin amework view: Pe ooms in o he effect ssessme: d the sc eory of c actices.	ment and rse outco PO5 PO5 c; 2 – Sig odology: nology c, Resear edagogic developi tiveness nt of inc chool cu hange. S Pedagog	PO7- Envir I finance, P omes with PO6 2 gnificant; Aims ar Theories rch questi cal praction ing countri of pedag cluded stu urriculum Strength a cic theory	a program PO <sub>7</sub> PO <sub>7</sub> 2 3 - Stron a program PO <sub>7</sub> 2 3 - Stron a cons. Ove ces are ries. Curr gogical p dies. How and gui and natu	nd sustair ong Learn noutcom PO <sub>8</sub> 2 2 2 yg nale, Pc rning, Cu rview of r being us iculum, T oractices v can tea dance m re of the	PO9 PO9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>8</sub> - 1 PO PO PO PO PO PO PO PO PO PO PO PO PO	Tourn Tourn Counn	s, PO <sub>9</sub> - I PO <sub>11</sub> d, Cor her ed search in form r the i curricu pport e ce for e	PO <sub>12</sub> 2 nceptua ucatior ing. mal an n-dept lum an effectiv
Course Outcomes CO <sub>1</sub> CO <sub>2</sub> CO <sub>3</sub> CO <sub>4</sub> Detailed Contents Unit: 1 Unit: 2	<b>PO</b> <sub>1</sub> 2	PO2 1 2 Introdu framev Conce Thema inform Eviden stage: practic pedago pedago and be Profess Peer St	Du- Project Mappin PO <sub>3</sub> 2 1 1 <b>1 - R</b> uction an vork an ptual fr tic over al classr ce on t quality a cum) and ogy? The ogical pr liefs and sional de upport fi	t manage g of cour PO4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ment and rse outco PO5 PO5 ke; 2 – Sig odology: nology c, Resear edagogic developi tiveness nt of inc chool cu change. S Pedagog gic strate ent: alig head tea	PO7- Envir I finance, P omes with PO6 2 gnificant; Aims an Theories sch questi cal praction ng countries sch questi cal praction of pedag cluded stu urriculum Strength a cic theory egies. mment w cher and	and ratio of lea ons. Ove ces are ies. Curr gogical p dies. How and gui and natu and ped	nd sustair ong Learn n outcom PO <sub>8</sub> 2 2 2 g nale, Pc rning, Cu rview of r being us iculum, T ractices w can tea dance m re of the agogical room pra nunity.	PO9 PO9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>8</sub> - 1 PO PO PO PO PO PO PO PO PO PO PO PO PO	Teach Count	PO <sub>11</sub> PO <sub>11</sub> d, Corner ed search in form n. r the i curricu pport e chers' a ow-up s	PO <sub>12</sub> 2 nceptua ucatior ing. mal an n-dept lum an effectiv effectiv effectiv suppor
Course Outcomes CO1 CO2 CO3 CO4 Detailed Contents Unit: 1 Unit: 2 Unit: 3	<b>PO</b> <sub>1</sub> 2	PO2 1 2 Introdu framev Conce Thema inform Eviden stage: practic pedago and be Profess Peer Su Curric Resear	Du- Project Mappin PO3 2 1 1 1- R uction an vork an ptual fr tic over al classr ce on t quality a cum) and ogy? The ogical pr liefs and sional de upport fu ulum and ch gaps	t manage g of cour PO4 2 2 easonable d termin amework view: Pe ooms in the effect ssessme d the sc eory of c actices. Pedagog evelopme rom the l d assessme and futur	ment and rse outco PO5 PO5 e; 2 – Sig odology: nology tiveness nt of inc chool cu change. S Pedagog gic strate ent: alig head tea nent Bar re direct	PO7- Envir I finance, P omes with PO6 2 gnificant; Aims an Theories rch questi al praction for pedag cluded stu urriculum Strength a fic theory egies. mment w cher and riers to le cions <sup>ID</sup> Res	and natu and ped ith classs the comr arring: li search	nd sustair ong Learn n outcom PO <sub>8</sub> 2 2 2 yg nale, Pc rning, Cu rview of r being us iculum, T ractices v can tea dance m re of the agogical room pra nunity. <u>mited res</u> design.	PO <sub>9</sub> es PO <sub>9</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>8</sub> - I PO PO PO PO PO PO PO PO PO PO PO PO PO	Tea Tea Tea Tea Tea Tea Tea Tea	s, PO <sub>9</sub> - I PO <sub>11</sub> d, Corn her ed l search in forr n. r the i curricu pport e ce for e chers' a pw-up s e class s gogy.	PO <sub>12</sub> 2 nceptua ucation ing. mal an n-dept lum an effectiv effectiv tttitude suppor
Course Outcomes CO1 CO2 CO3 CO4 Detailed Contents Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5	PO1 2	PO2 1 2 Introdu framev Conce Thema inform Eviden stage: practic pedago pedago and be Profess Peer Su Curric Resear educat	Du- Project Mappin PO3 2 1 1 1- R uction an vork an ptual fra tic over al classr- ce on t quality a cum) and ogy? The ogical pr liefs and sional de upport fra ulum and ch gaps ion. Cur	t manage g of cour PO4 2 2 easonable ad termin amework view: Pe ooms in o he effect ssessme: d the so eory of c actices. Pedagog evelopme com the l d assessm and futur riculum a	ment and rse outco PO5 PO5 e; 2 – Sig odology: nology c, Resear edagogic developi tiveness nt of inc chool cu change. S Pedagog gic strate ent: alig head tea nent Bar re direct and asse	PO7- Envir I finance, P omes with PO6 2 gnificant; Aims ar Theories rch questi cal practic ing countr of pedag cluded stu urriculum Strength a fic theory egies. mment w cher and riers to lec instructions	and ped ith classs the comr issearch Dissemir	nd sustair ong Learn noutcom PO <sub>8</sub> 2 2 2 yg nale, Pc rning, Cu rview of r being us iculum, T oractices v can tea dance m re of the agogical room pra nunity. mited res design. nation and	ability, ing es PO <sub>9</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>8</sub> - I PO PO PO PO PO PO PO PO PO PO PO PO PO	Ethic Proun Pr	s, PO <sub>9</sub> - I PO <sub>11</sub> d, Corner ed search in form r the i curricu pport e ce for e chers' a pw-up s e class s gogy. t.	POn 2 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1
Course Outcomes CO1 CO2 CO3 CO4 Detailed Contents Unit: 1 Unit: 2 Unit: 3	PO1 2	PO2 1 2 Introdu framew Conce Thema inform Eviden stage: practic pedago pedago and be Profess Peer Si Curricu Resear educat	D1- Project         Mappin         PO3         2         1         1 - R         uction and vork are ptual fraction of the provide of	t manage g of cour PO4 2 2 easonabl nd Metho nd termin amework view: Pe ooms in o he effect ssessme: d the so cory of c actices. Pedagog evelopme rom the l d assessme and futur riculum a nclude b	ment and rse outco PO5 PO5 c, 2 - Sig odology: hology c, Resear edagogic developi tiveness nt of inc chool cu hange. S Pedagog gic strate ent: alig head tea nent Bar re direct and asse oth inte	PO7- Envir I finance, P omes with PO6 2 gnificant; Aims ar Theories rch questi cal praction ing countri of pedag cluded stu urriculum Strength a fic theory egies. finment w cher and riers to lec issment <sup>III</sup>	and ratio of lea ons. Ove ces are ies. Curr gogical p dies. How and gui and natu and ped ith class the comp arning: li search Dissemin iation (15)	nd sustair ong Learn noutcom PO <sub>8</sub> 2 2 2 49 nale, Po ruing, Cu rview of r being us iculum, T rractices v can tea dance m re of the agogical room pra nunity. mited res design. nation and 5 marks)	ability, ing es PO <sub>9</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>8</sub> - I PO PO PO PO PO PO PO PO PO PO PO PO PO	Ethic Toun Foun Participan	s, PO <sub>9</sub> - I PO <sub>11</sub> d, Cor her ed search in form n. r the i curricu pport e chers' a pw-up s e class s gogy. t. class s	POn 2 2 nceptua ucation ing. mal an n-dept lum an effectiv effectiv ttitude suppor sizes. Teache
Course Outcomes CO1 CO2 CO3 CO4 Detailed Contents Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and	PO1 2	PO2 1 2 Introdu framew Conce Thema inform Eviden stage: practic pedago pedago and be Profess Peer Si Curricu Resear educat	D1- Project       Mappin       PO3       2       1       1 - R       uction and vork are ptual fraction of the provide of the p	t manage g of cour PO4 2 2 easonabl nd Metho nd termin amework view: Pe ooms in o he effect ssessme: d the so cory of c actices. Pedagog evelopme rom the l d assessme and futur riculum a nclude b	ment and rse outco PO5 PO5 c, 2 - Sig odology: hology c, Resear edagogic developi tiveness nt of inc chool cu hange. S Pedagog gic strate ent: alig head tea nent Bar re direct and asse oth inte	PO7- Envir I finance, P omes with PO6 2 gnificant; Aims ar Theories rch questi cal praction ing countri of pedag cluded stu urriculum Strength a fic theory egies. finment w cher and riers to lec issment <sup>III</sup>	and ratio of lea ons. Ove ces are ies. Curr gogical p dies. How and gui and natu and ped ith class the comp arning: li search Dissemin iation (15)	nd sustair ong Learn noutcom PO <sub>8</sub> 2 2 2 49 nale, Po ruing, Cu rview of r being us iculum, T rractices v can tea dance m re of the agogical room pra nunity. mited res design. nation and 5 marks)	ability, ing es PO <sub>9</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>8</sub> - I PO PO PO PO PO PO PO PO PO PO PO PO PO	Ethic Toun Foun Participan	s, PO <sub>9</sub> - I PO <sub>11</sub> d, Cor her ed search in form n. r the i curricu pport e chers' a pw-up s e class s gogy. t. class s	PO12 2 nceptua ucation ing. mal an n-dept lum an effectiv effectiv effectiv suppor sizes. Teache
Course Outcomes CO1 CO2 CO3 CO4 Detailed Contents Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment	PO1 2	PO2 1 2 Introdu framew Conce Thema inform Eviden stage: practic pedago pedago and be Profess Peer Si Curricu Resear educat	D1- Project       Mappin       PO3       2       1       1 - R       uction and vork are ptual fraction of the provide of the p	t manage g of cour PO4 2 2 easonabl nd Metho nd termin amework view: Pe ooms in o he effect ssessme: d the so cory of c actices. Pedagog evelopme rom the l d assessme and futur riculum a nclude b	ment and rse outco PO5 PO5 c, 2 - Sig odology: hology c, Resear edagogic developi tiveness nt of inc chool cu hange. S Pedagog gic strate ent: alig head tea nent Bar re direct and asse oth inte	PO7- Envir I finance, P omes with PO6 2 gnificant; Aims ar Theories rch questi cal praction ing countri of pedag cluded stu urriculum Strength a fic theory egies. finment w cher and riers to lec issment <sup>III</sup>	and ratio of lea ons. Ove ces are ies. Curr gogical p dies. How and gui and natu and ped ith class the comp arning: li search Dissemin iation (15)	nd sustair ong Learn noutcom PO <sub>8</sub> 2 2 2 49 nale, Po ruing, Cu rview of r being us iculum, T rractices v can tea dance m re of the agogical room pra nunity. mited res design. nation and 5 marks)	ability, ing es PO <sub>9</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>8</sub> - I PO PO PO PO PO PO PO PO PO PO PO PO PO	Ethic Toun Foun Participan	s, PO <sub>9</sub> - I PO <sub>11</sub> d, Cor her ed search in form n. r the i curricu pport e chers' a pw-up s e class s gogy. t. class s	PO <sub>1</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Course Outcomes CO₁ CO₂ CO₃ CO₄ Detailed Contents Unit: 1 Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment examination.	PO1 2	PO2 1 2 Introdu framev Conce Thema inform Eviden stage: practic pedago and be Profess Peer Su Curric Resear educat on Patte	Du- Project Mappin PO <sub>3</sub> 2 1 1 <b>1 - R</b> uction an vork an ptual fr tic over al classre- ce on t quality a cum) and ogy? The ogical pr liefs and sional de upport fu ulum and ch gaps ion. Cur ern: It in ar presen	t manage g of cour PO4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ment and rse outco $PO_5$ PO	PO7- Envir I finance, P omes with PO6 2 gnificant; Aims an Theories rch questi cal praction of pedag cluded stu urriculum Strength a cic theory egies. mment w cher and riers to lef cions <sup>III</sup> Re: ssment <sup>III</sup>	and ratio of lea ons. Ove ces are dies. Hov and gui and natu and ped ith class the comp arning: li search Dissemin tation (15)	nd sustair ong Learn n outcom PO <sub>8</sub> 2 2 4 9 nale, PC rning, Cu rview of r being us iculum, T ractices w can tea dance m re of the agogical room pra nunity. mited res design. nation and 5 marks) (35 mark	ability, ing es PO <sub>9</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO <sub>8</sub> - 1 PO PO PO PO PO PO PO PO PO PO 8- 1 PO PO PO 8- 1 PO PO PO 8- 1 PO PO 8- 1 PO 90 PO 8- 1 PO 90 PO 90 90 90 90 90 90 90 90 90 90 90 90 90	Ethic To and To and	s, PO <sub>9</sub> - I PO <sub>11</sub> d, Corner ed search in form r the i curricu pport e chers' a pw-up s e class s gogy. t. class s ly end s	PO <sub>1</sub> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

	(3):361-379.
Refe	rence Books:
1	Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project
	(MUSTER) country report 1. London: DFID.
2	Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading
	in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3):272–282.

	Course Code									Lecture									
77 1 40	MTAC214PET		Stress Management by Yoga						L	Т	Р	Semester: II							
Version: 1.2		Date of Approval: 16th BoS 17-11-2022						2	0	0									
	Scheme o							Scheme	of Exa	minat	ion								
	f Periods	: 30	Hrs.						Maximu			:	50						
Period	s/Week	: 2 Internal E						ernal Ev	valuati	ion	:	15							
	Credits	: -										35							
Instructio			cture						Exam	Durati	ion	:	2 Hrs.						
Prerequisite(s): N		c prere	quisite																
Course Objectives																			
1. To achieve over		h of boo	ly and mi	nd.															
2. To overcome																			
3. To learn differ																			
4. To organize yo	0	hops																	
Course Outcomes	; (CO):																		
COs No.		Statement									Mapped Program								
												comes							
CO <sub>1</sub>	Understand the healthy mind in a healthy body thus improving social										PO <sub>6</sub> , PO <sub>7</sub> , PO <sub>8</sub>								
CO <sub>2</sub>	health. Understand the Improved efficiency with different asans.										PO <sub>6</sub> , PO <sub>7</sub> , PO <sub>8</sub> , PO12								
CO <sub>2</sub>	Understa									r		07, PO7,							
CO <sub>3</sub>	Apply and					g with asa	115.			Т			<b>PO</b> <sub>8</sub> , <b>PO</b> <sub>12</sub>						
problems, <b>PO</b> 5- Moc or team work, <b>PO</b> 10-			<b>0</b> 11- Projec	, t manage	ment and		<b>O</b> 12- Life-l	long Learr	ning	, 108		5, 105							
Course Outcomes	S PO <sub>1</sub>	PO <sub>2</sub>	<b>PO</b> <sub>3</sub>	<b>PO</b> <sub>4</sub>	<b>PO</b> 5	PO <sub>6</sub>	<b>PO</b> 7	PO <sub>8</sub>	PO <sub>9</sub>	PC	20	<b>PO</b> <sub>11</sub>	PO <sub>12</sub>						
CO <sub>1</sub>		102	103	104	105	3	2	2	109		/10	IOI	1012						
CO <sub>2</sub>						2	3	2					2						
CO3						3	3	2	2										
CO4	_					2	3	3	-				3						
			1 - R	easonabl	e: 2 – Sia		ÿ	-	1				0						
Detailed Contents	s:				.,	<u>,,.</u>		-9											
Unit: 1		Defini	tions of E	ight par	ts of yog	. ( Ashtan	ga)												
		Definitions of Eight parts of yog. (Ashtanga) Yam and Niyam. Do`s and Don't's in life. Ahinsa, satya, astheya, bramhacharya and																	
		aparigraha.																	
Unit: 2		aparig	i alla.							Shaucha, santosh, tapa, swadhyay,ishwar pranidhan									
Unit: 2 Unit: 3		Shauc	ha, santo																
		Shauc	ha, santo						or min	d &bo	dy.								
Unit: 3		Shauc Asan a	ha, santo: nd Prana	yam, Va	rious yog	ay,ishwar g poses an iniques ar	d their b	enefits f											
Unit: 3 Unit: 4 Unit: 5 <b>Examination and</b> exams/ assignment		Shauc Asan a Regula on Patt	ha, santos nd Prana arization o <b>ern:</b> It in	yam, Van of breath clude b	rious yog ning tech oth inter	g poses an iniques ar rnal evalu	d their b d its effe ation (15	enefits f ects-Typ 5 marks)	es of p comp	ranaya rising	ama. two								
Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment examination.		Shauc Asan a Regula on Patt	ha, santos nd Prana arization o <b>ern:</b> It in	yam, Van of breath clude b	rious yog ning tech oth inter	g poses an iniques ar rnal evalu	d their b d its effe ation (15	enefits f ects-Typ 5 marks)	es of p comp	ranaya rising	ama. two								
Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment examination. Text Books:	nts/ quiz/	Shauc Asan a Regula on Patt / semin	ha, santos nd Prana arization ( <b>ern:</b> It in ar presen	yam, Van of breath clude b atation e	rious yog ning tech oth inter tc. and e	g poses an iniques ar rnal evalu xternal ev	d their b d its effe ation (15 valuation	eenefits f ects-Typ 5 marks) (35 mar)	es of p comp ks) whi	ranaya rising ch is 1	ama. two nainl								
Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment examination. Text Books: 1 'Yogic Asar	nts/ quiz/ nas for Gr	Shauc Asan a Regula on Patt / semin	ha, santos nd Prana arization ( <b>ern:</b> It in ar presen	yam, Van of breath clude b atation e	rious yog ning tech oth inter tc. and e	g poses an iniques ar rnal evalu xternal ev	d their b d its effe ation (15 valuation	eenefits f ects-Typ 5 marks) (35 mar)	es of p comp ks) whi	ranaya rising ch is 1	ama. two nainl								
Unit: 3 Unit: 4 Unit: 5 Examination and exams/ assignment examination. Text Books:	nts/ quiz/ nas for Gr	Shauc Asan a Regula <b>on Patt</b> / semin	ha, santo: nd Prana arization ( ern: It in ar presen arining-F	yam, Van of breath iclude b itation e Part-I":Ja	rious yog ning tech oth inter tc. and e anardan	g poses an iniques ar rnal evalu xternal ev Swami Y	d their b ad its effe ation (15 valuation cogabhy	enefits f ects-Typ 5 marks) (35 mar asi Man	<u>es of p</u> comp ks) whi dal, Na	ranaya rising ch is r agpur	ama. two nainl	ly end s	semeste						

Course Code		Course Title Lectur													
MTAC215PET		Tarseel-e-Urdu/Elementary Urdu   L   T								Semester:					
Version: 1.2		Date of Approval: 16th BoS 17-11-2022						2	0 0	÷					
		of Instr					S	cheme of							
	f Periods	: 30	Hrs.							n Score	:	50			
Period	s/Week	: 2				Internal Evalua					:	15			
	Credits	·						emester	:	35					
Instructi			ture					I	Exam D	uration	:	2 Hrs.			
Prerequisite(s)		ific prei	requisit	e											
Course Objecti							•								
1. Understand												, <b>.</b>			
2. Develop a b											aajec	tives.			
<ol> <li>Understand</li> <li>Communic</li> </ol>											ong	and hadi			
<ol> <li>Communic conversation</li> </ol>		uvery in	Uluu	in Dasi	social	situatioi	is, such a	is greeti	ngs, n	uouucu	ons,	anu basi			
Course Outcon															
COs No.	ies (CO).				Statom	ont				Mo	nnod	Drogram			
COS NO.		Statement										Mapped Program Outcomes (POs)			
CO <sub>1</sub>	Ability to	read an	d write I	Irdu ser	int and h	asic texts	in Urdu				PO <sub>10</sub>				
					-			or and a	vntov i	n					
			understand and use basic Urdu vocabulary, grammar, and syntax in <b>PO</b> <sup>10</sup>												
CO <sub>3</sub>			ntences and conversations. PO <sub>10</sub> , PO <sub>12</sub> PO <sub>10</sub> , PO <sub>12</sub>												
003	•											,1 012			
CO <sub>4</sub>			ordering food, and asking for directions. Inding of the cultural context and social norms of Urdu-speaking PO <sub>10</sub> , PO <sub>12</sub>									PO <sub>12</sub>			
004	commun	0	i the c		Jontext	and socie		Ji Oldu i	speakin	5	2 0 10	,2 012			
PO1- Engineering			oblem ar	alvsis. PC	) <sub>3</sub> - Design	/developn	nent of solu	tions. <b>PO</b> 4-	Condu	ct investig	ations	of comple			
problems, <b>PO</b> <sub>5</sub> - N															
or team work, <b>PO</b>															
		-	Марр	ing of co	ourse out	comes wi	th progran	n outcom	es						
Course	PO <sub>1</sub>	PO <sub>2</sub>	PO <sub>3</sub>	PO <sub>4</sub>	PO <sub>5</sub>	PO <sub>6</sub>	<b>PO</b> <sub>7</sub>	PO <sub>8</sub>	PO <sub>9</sub>	<b>PO</b> <sub>10</sub>	PO	11 <b>PO</b> 12			
Outcomes			- 00			100	- 07	100	- 00		- 0.				
CO <sub>1</sub>										2					
$CO_2$										2					
CO <sub>3</sub>										2		2			
CO <sub>4</sub>										2		2			
			1 -	Reason	ıble; 2 – 9	Significan	t; 3 – Stroi	ıq							
Detailed Conte	nts:							0							
								U		/					
		معدانا	1 2 1/ac	افار <b>غ</b> ۲	في الفاظ متن	7440 18	کی تحریریا	U	كلىس، د	ف شہجی کی شر	. 7.1	ş. 			
Unit: 1		لفاظ،دو	ر،چار حرفی	ن حر في الفاظ	في الفاظ، تير	<i>ر</i> اب، دوحر	ف کی تحریر،ا	U	کلیں،دو	ف تہجی کی ش	ڨ، حروا	د د حروف شم <sup>ت</sup> م			
Unit: 1		الفاظ،دو	ر،چار حرفی	ن حرفی الفاظ	في الفاظ، تير	<i>ار</i> اب، دوحر	ف کی تحریر ،ا	U	کلیں،دو						
Unit: 1		الفاظ، دو	ر،چار حر فی ا	ن حرفی الفاظ	في الفاظ، تير	<i>ار</i> اب،دوحر		چشمی <sub>ه</sub> ، حروا		نلے۔	لفظی ج	نظی جملے،چار			
Unit: 1 Unit: 2		الفاظ،دو	ر،چار حرفی ا	ن حر في الفاظ	في الفاظ، تير	<i>ار</i> اب، دوحر		چشمی <sub>ه</sub> ، حروا		نلے۔	لفظی ج	نظی جملے،چار			
		الفاظ، دو	، ،چار حر فی				رچزیں۔	چشمی هه، حرون و هوا، گفر او	سم اورآب	کیلے۔ سبزیاں،مو	لفظی <u>ج</u> چلاور	نطی جملے،چار ناور مہینے، کج			
		الفاظ، دو	، ، چار حر فی ا ا				رچزیں۔	چشمی هه، حرون و هوا، گفر او	سم اورآب	کیلے۔ سبزیاں،مو	لفظی <u>ج</u> چلاور	نطی جملے،چار ناور مہینے، کج			
Unit: 2		الفاظ،دو	، ، چار حر فی ا			ی موقعوں -	رچيزيں۔ چندالفاظ،خاص	چیشی ہے، حروا چیشی ہے، حروا وہوا، گھراو استعال کے:	سم اورآب بینک،عام	ملے۔ سبزیاں،مو ےاسٹیشن،	لفظی ج چلاور ر،ریلو۔	ظی جملے، چار ناور مہینے، <sup>ب</sup> زار،ڈاک گھر			
Unit: 2		لفاظ،دو	، مچار حر فی ا ا			ی موقعوں -	رچيزيں۔ چندالفاظ،خاص	چیشی ہے، حروا چیشی ہے، حروا وہوا، گھراو استعال کے:	سم اورآب بینک،عام	ملے۔ سبزیاں،مو ےاسٹیشن،	لفظی ج چلاور ر،ریلو۔	نظی جملے، چار ن اور مہینے، <sup>ب</sup> زار،ڈاک گھر			
Unit: 2 Unit: 3		لفاظ،دو	، ، چار حر فی ا ا			ی موقعوں -	رچيزيں۔ چندالفاظ،خاص بےاور ضرب	چشمی ہے ، حروا وہوا، گھراد استعال کے : کی جمع، محادر	سم اورآب بینک،عام اور صفت	ملے۔ سبزیاں،مو ےاسٹیشن، ن،اسم فعل	لفظی ج چلاور ر،ریلو۔ ں،صفین	ظی جملے،چار ناور مہینے، <sup>ب</sup> زار،ڈاک گھ م، ضمیر ، فعل			
Unit: 2 Unit: 3		الفاظ، دو	، ، چار حر فی ا			ی موقعوں -	رچيزيں۔ چندالفاظ،خاص بےاور ضرب	چشمی ہے ، حروا وہوا، گھراد استعال کے : کی جمع، محادر	سم اورآب بینک،عام اور صفت	ملے۔ سبزیاں،مو ےاسٹیشن، ن،اسم فعل	لفظی ج چلاور ر،ریلو۔ ں،صفین	ظی جملے،چار ناور مہینے، <sup>ب</sup> زار،ڈاک گھ م، ضمیر ، فعل			
Unit: 2 Unit: 3 Unit: 4 Unit: 5				اد_	کے جملے،اعد	) مو قعوں _ الامثال_	رچيزيں۔ چندالفاظ،خاص بےاور ضرب باکاترانہ۔	چشی ہے، حرون بوہوا، گھر اور استعال کے . ار دویو نیور سڑ	سم اورآب یبنک،عام اور صفت زاد نیشنل	ملے۔ سبزیاں، مو ےاسٹیشن،: نیاں، مولاناآ	لفظی <u>ج</u> چلاور ر،ریلو۔ ب،کہان	ظی جملے، چار ناور مہینے، کچ زار،ڈاک گھ ہم، ضمیر، فعل بارتیں، نظمیہ			
Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination a	nd Evalua	tion Pat	t <b>tern:</b> It	ار۔ include	کے جملے،اعد both in	ی موقعوں ۔ الامثال۔ ternal eva	رچيزيں۔ پيندالفاظ،خاص ےاور ضرب پاکاترانہ۔ 12 aluation	چیشی ہے ، حرو چیشی ہے ، حرو په دہوا، گھر او استعال کے . کی جمع، محاور اردویو نیور سٹے marks	سم اورآب ینک،عام اور صفت زاد نیشنل compri	ملے۔ سبزیاں، مو ےاسٹیشن، نے،اسم فعل ایال، مولاناآ sing two	لفظی <u>ج</u> چل اور ر،ریلو۔ ں،صفین راass	ظی جملے، چار ناور مہینے، کچ زار،ڈاک گھ م، ضمیر، فعر بار تیں، نظمیہ s sessiona			
Unit: 2 Unit: 3 Unit: 4 Unit: 5 <b>Examination a</b> exams/ assignr	nd Evalua	tion Pat	t <b>tern:</b> It	ار۔ include	کے جملے،اعد both in	ی موقعوں ۔ الامثال۔ ternal eva	رچيزيں۔ پيندالفاظ،خاص ےاور ضرب پاکاترانہ۔ 12 aluation	چیشی ہے ، حرو چیشی ہے ، حرو په دہوا، گھر او استعال کے . کی جمع، محاور اردویو نیور سٹے marks	سم اورآب ینک،عام اور صفت زاد نیشنل compri	ملے۔ سبزیاں، مو ےاسٹیشن، نے،اسم فعل ایال، مولاناآ sing two	لفظی <u>ج</u> چل اور ر،ریلو۔ ں،صفین راass	ظی جملے، چار ناور مہینے، کچ زار،ڈاک گھ م، ضمیر، فعر بار تیں، نظمیہ s sessiona			
Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination a exams/ assignmexamination.	nd Evalua	tion Pat	t <b>tern:</b> It	ار۔ include	کے جملے،اعد both in	ی موقعوں ۔ الامثال۔ ternal eva	رچيزيں۔ پيندالفاظ،خاص ےاور ضرب پاکاترانہ۔ 12 aluation	چیشی ہے ، حرو چیشی ہے ، حرو په دہوا، گھر او استعال کے . کی جمع، محاور اردویو نیور سٹے marks	سم اورآب ینک،عام اور صفت زاد نیشنل compri	ملے۔ سبزیاں، مو ےاسٹیشن، نے،اسم فعل ایال، مولاناآ sing two	لفظی <u>ج</u> چل اور ر،ریلو۔ ں،صفین راass	ظی جملے، چار ناور مہینے، کچ زار،ڈاک گھ م، ضمیر، فعر بار تیں، نظمیہ s sessiona			
Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination a exams/ assignmexamination. Text Books:	<b>nd Evalua</b> nents/ qu	tion Pat	t <b>tern:</b> It nar pres	ار۔ include	کے جملے،اعد both in	ی موقعوں ۔ الامثال۔ ternal eva	رچيزيں۔ پيندالفاظ،خاص ےاور ضرب پاکاترانہ۔ 12 aluation	چیشی ہے ، حرو چیشی ہے ، حرو په دہوا، گھر او استعال کے . کی جمع، محاور اردویو نیور سٹے marks	سم اورآب ینک،عام اور صفت زاد نیشنل compri	ملے۔ سبزیاں، مو ےاسٹیشن، نے،اسم فعل ایال، مولاناآ sing two	لفظی <u>ج</u> چل اور ر،ریلو۔ ں،صفین راass	ظی جملے، چار ناور مہینے، کچ زار،ڈاک گھ م، ضمیر، فعر بار تیں، نظمیہ s sessiona			
Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination a exams/ assignmexamination. Text Books: 1 Elementa	<b>nd Evalua</b> nents/ qu ıry Urdu" l	<b>ition Pat</b> iiz/ semi	t <b>tern:</b> It nar pres	او include sentatior	کے جملے،اعد both in	ی موقعوں ۔ الامثال۔ ternal eva	رچيزيں۔ پيندالفاظ،خاص ےاور ضرب پاکاترانہ۔ 12 aluation	چیشی ہے ، حرو چیشی ہے ، حرو په دہوا، گھر او استعال کے . کی جمع، محاور اردویو نیور سٹے marks	سم اورآب ینک،عام اور صفت زاد نیشنل compri	ملے۔ سبزیاں، مو ےاسٹیشن، نے،اسم فعل ایال، مولاناآ sing two	لفظی <u>ج</u> چل اور ر،ریلو۔ ں،صفین راass	ظی جملے، چار ناور مہینے، کچ زار،ڈاک گھ م، ضمیر، فعر بار تیں، نظمیہ s sessiona			
Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination a exams/ assignmexamination. Text Books: 1 Elementa 2 Urdu for	nd Evalua nents/ qu ury Urdu" l Beginners	<b>ition Pat</b> iiz/ semi	t <b>tern:</b> It nar pres	او include sentatior	کے جملے،اعد both in	ی موقعوں ۔ الامثال۔ ternal eva	رچيزيں۔ پيندالفاظ،خاص ےاور ضرب پاکاترانہ۔ 12 aluation	چیشی ہے ، حرو چیشی ہے ، حرو په دہوا، گھر او استعال کے . کی جمع، محاور اردویو نیور سٹے marks	سم اورآب ینک،عام اور صفت زاد نیشنل compri	ملے۔ سبزیاں، مو ےاسٹیشن، نے،اسم فعل ایال، مولاناآ sing two	لفظی <u>ج</u> چل اور ر،ریلو۔ ں،صفین راass	ظی جملے، چار ناور مہینے، کچ زار،ڈاک گھ م، ضمیر، فعر بار تیں، نظمیہ s sessiona			
Unit: 2 Unit: 3 Unit: 4 Unit: 5 Examination a exams/ assignment examination. Text Books: 1 Elementa 2 Urdu for Reference Bool	nd Evalua nents/ qu ury Urdu" l Beginners <b>xs:</b>	tion Pat iz/ semi by Azra F	t <b>tern:</b> It nar pres Chanam 1 Akbar a	ارے include sentatior <u>Ali Shah</u>	کے جملے،اعد both in n etc. and	موقعوں ۔ الامثال۔ ternal eva external	رچيزيں۔ چندالفاظ،خا <sup>حر</sup> ےاور ضرب کا ترانہ۔ evaluation (15 evaluation	چیشی ہے ، حرو چیشی ہے ، حرو استعال کے : کی جیع ، محاور اردو یو نیور سٹے 5 marks) (35 mark	سم اورآب ینک،عام اور صفت زاد نیشنل compri	ملے۔ سبزیاں، مو ےاسٹیشن، نے،اسم فعل ایال، مولاناآ sing two	لفظی <u>ج</u> چل اور ر،ریلو۔ ں،صفین راass	ظی جملے، چار ناور مہینے، کچ زار،ڈاک گھ م، ضمیر، فعر بار تیں، نظمیہ s sessiona			
Unit: 2 Unit: 3 Unit: 3 Unit: 4 Unit: 5 Examination a exams/ assignment examination. Fext Books: 1 Elementa 2 Urdu for Reference Bool 1 A Progress	nd Evalua nents/ qu ury Urdu" l Beginners <b>xs:</b>	tion Pat iz/ semi by Azra F by Syec se of Uro	t <b>tern:</b> It nar pres (hanam d Akbar 4 du" by M	ار include sentatior Ali Shah . Haroor	کے جملے، اعد both in n etc. and	ی موقعوں _ الامثال_ ternal eva external	رچيزيں۔ چندالفاظ،خا <sup>ص</sup> ےاور ضرب کاترانہ۔ evaluation (15 evaluation	چیشی ہے ، حرو چیشی ہے ، حرو استعال کے : کی جیع ، محاور اردو یو نیور سٹے 5 marks) (35 mark	سم اورآب ینک،عام اور صفت زاد نیشنل compri	ملے۔ سبزیاں، مو ےاسٹیشن، نے،اسم فعل ایال، مولاناآ sing two	لفظی <u>ج</u> چل اور ر،ریلو۔ ں،صفین راass	نظی جملے، چار ناور مہینے، کچ زار،ڈاک گھ م، ضمیر، فعر بار تیں، نظمیہ s sessiona			