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

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

B. Range of credits:

A student requires to complete total 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	Creats	
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

			1	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	PC	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	М	LTD	Credits		
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)

	SEM	1ESTER – 2				
Pro	ogram Elective – I	Pı	rogram Elective – II			
Course Code	Course Title	Course Code	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	MTAC211PET	English for Researc	h Paper Writing			
Ν	ATAC212PET	Value Education				
Ν	ATAC213PET	Pedagogy Studies				
Ν	ATAC214PET	Stress Managemen	t by Yoga			
Ν	ATAC215PET	Tarseel-e-Urdu/El	ementary Urdu			
		·				
	SEM	IESTER - 3				
Pro	gram Elective – III	Program Elective – IV				
Course Code	Course Title	Course Code	Course Title			
MTCS331PET	Artificial Neural Networks	MTCS341PET	Blockchain Technology			
MTCS332PET	Machine Learning with Big Data	MTCS342PET	Bio-image computing			
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		ogram Elective – VI			
110	0		0			
	Course Title	Course Code	L Course Little			
Course Code MTCS451PET	Course Title Cloud Computing	Course Code MTCS461PET	Course Title Graphics Processing Unit			
Course Code	Cloud Computing Wireless Access					
Course Code MTCS451PET	Cloud Computing Wireless Access Technologies	MTCS461PET	Graphics Processing Unit Computing Statistical Data Analysis			
Course Code MTCS451PET MTCS452PET	Cloud Computing Wireless Access	MTCS461PET MTCS462PET	Graphics Processing Unit Computing			

	ode				Course					ture	P Semester: I	
MTCS111F	PCT		-			lgorithm			L	-		
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 ₁	Understa	ind the F	rogrami	ning Pro	blem Sta	atements	for Algoritl	nms.		P	O ₁ , PO ₂ ,	PO ₄
CO ₂	Understa	ind the r	lecessary	y mather	natical a	bstraction	n to solve				PO ₂ , PO	D 4
	problems				-	-						
CO ₃	Analyze t	he Effici	ency and	d Proofs	of Corre	ectness in	Algorithms	5			PO ₃ , PO	D 5
CO ₄	Compreh	nend and	d select	algorith	m desig	gn approa	aches in a	problem	n specifi	2 P (D ₄ , PO ₉ ,	PO ₁₂
	manner.			0	· · · ·	5 11		1	1		, .,	
PO ₁ - Enginee	ering Kno	owledge,	PO ₂ -	Problem	analys	is, PO 3-	Design/d	evelopme	nt of s	olutions,	PO ₄ - (Conduc
investigations												
sustainability,			· Individu	ual or tea	am work	, РО 10- Сс	ommunicat	ion, PO 11-	Project i	nanagen	nent and t	finance
PO12- Life-lon	g Learnin	g										
			Map	oping of	course o	nutcomes	with near	am outco	mor			
				1 0	course o	Jucomes	with progr		mes			
Course	PO₁	PO ₂	PO ₂							PO10	PO	PO
Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
Outcomes CO ₁	PO ₁	2	PO ₃	PO ₄						PO ₁₀	PO ₁₁	PO
Outcomes CO1 CO2				PO ₄	PO ₅					PO ₁₀	PO ₁₁	PO
Outcomes CO1 CO2 CO3		2	PO ₃	PO ₄ 3 2					PO ₉	PO ₁₀	PO ₁₁	PO
Outcomes CO1 CO2		2	2	PO₄ 3 2 3 3	PO 5	PO ₆	PO ₇	PO ₈		PO ₁₀	PO ₁₁	PO ₁₂
Outcomes CO1 CO2 CO3 CO4	3	2	2	PO₄ 3 2 3 3	PO 5	PO ₆		PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
Outcomes CO1 CO2 CO3 CO4	3	2 3	2	PO ₄ 3 2 3 - Reaso	PO5 3 nable; 2	PO ₆	PO7 ant; 3 – Sti	PO ₈	PO ₉			PO12
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cont	a a constant a constan	2 3 Introd	2 1 luction	PO ₄ 3 2 3 - Reaso to algo:	PO5 3 nable; 2	PO ₆ - Signific	PO7 ant; 3 - Str	PO ₈	PO ₉	eorem,	Sorting:	1 Quicl
Outcomes CO1 CO2 CO3 CO4	a a constant a constan	2 3 Introd Sort,	2 1 luction Heap S	PO ₄ 3 2 3 1 - Reaso to algoi ort, Sh	PO₅ 3 nable; 2 rithm, 0 aker So	PO ₆ - Signific Growth o ort, and	PO7 ant; 3 – Str	PO ₈ rong ons, Mast g Sort. A	PO ₉	eorem,	Sorting:	1 Quicl
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cont	a a constant a constan	2 3 Introd Sort, recurr	2 1 luction Heap S rence re	PO ₄ 3 2 3 - Reaso ort, Sh elations	PO5 3 nable; 2 rithm, 0 aker So using s	PO ₆ - Signific Growth o ort, and substituti	PO7 ant; 3 – Str of function Counting	PO ₈	PO9 2 ter's The Asympto	eorem,	Sorting: tation; S	1 Quicl Solving
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Cont	a a constant a constan	2 3 Introd Sort, recurr Greed	2 luction Heap S rence re	PO ₄ 3 2 3 - Reaso to algor ort, Sh elations nod: Mi	PO₅ 3 nable; 2 rithm, (aker So using s nimum	PO ₆ - Signific Growth o ort, and substituti Spanni	PO7 ant; 3 – Str of functio Counting ion metho ng Tree-	PO ₈ 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 ₁ CO ₂ CO ₃ CO ₄ Detailed Cont	ents:	2 3 Introd Sort, recurr Greed	2 luction Heap S rence re	PO ₄ 3 2 3 - Reaso to algor ort, Sh elations nod: Mi	PO₅ 3 nable; 2 rithm, (aker So using s nimum	PO ₆ - Signific Growth o ort, and substituti Spanni	PO7 ant; 3 – Str of function Counting	PO ₈ 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
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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 ₈ 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	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 ₈ 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 ₉ 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
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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 ₈ 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 ₉ 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 ation Pa	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 namic nan-Foi Longes roducti n Karp fatrix M -Comple rd and llel alg nimes (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 oblems: mplete C Parallel rallel Algo uation (30	PO ₈ rong ons, Mast g Sort. A od. Prim's A incipal ll Pairs ence (LCS ching, ap ith Mo reling Sal Basic C lasses, C Algorith prithm Si marks) co	PO ₉ 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
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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 oval: 16t	h BoS 17-			4	0 0		
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Period	s/Week	: 4						Inte		aluation	:	30
	Credits	: 4								emester	:	70
Instructio			cture						Exam D	uration	:	3 Hrs.
Prerequisite(s):		Mathema	atics									
Course Objectiv			0 1 1 1									
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CO ₄	0					telligence					D ₂ , PO ₄	
PO1- Engineering	Knowledge	e, PO 2- Pr	oblem an	alysis, PO	3- Design	/developn	nent of solut	tions, PO4	- Condu			
problems, PO 5- M	odern tool	usage, P	D ₆ - The e	ngineer a	nd societ	y, PO 7- En	vironment a	nd sustair	hability, 1			
or team work, PO 1	o- Commu	nication, I										
			Mappi	ng of co	urse out	comes wi	th program	outcom	es			
Course	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO
Outcomes	101	102	103	104	105	100	10/	10.	109	1010	101	1012
CO ₁	2	2										
CO_2		2										
CO ₃			2	1								
CO ₄		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
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							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.			
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MTCS111F	Course CodeCourse TitleLectureMTCS111RMTResearch Methodology and IPRLT											
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	s/Week	: 4	1115.						ernal Eval		: 30	
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											utcomes	
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	scientif			Ũ					-		PO ₁₂	
CO ₂	Apply t	he svs	tematic	appro	ach to	achieve	researc	h obiect	tives an	d PC	D 4, PO 8,	PO ₉
	analyse	-						j		-		
CO ₃	2			tten re	esearch	naper	s and de	efend ir	n review	V P	O ₄ , PO ₆ ,	PO ₁₂
	commit		icii wii		locul ci	i puper	s and a			v	, ,	
CO ₄	Develo		rts and	files							PO ₆ , PO)12
PO1- Engineerii					PO ₂ - Desi	ion /develo	pment of so	lutions PC	A- Conduc	rt investio	-	
problems, PO ₅ -												
or team work, I	P O 10- Comn	nunicatio										
		[Map	ping of	course o	utcomes	with progr	am outco	mes			1
Course Outcomes	PO ₁	PO_2	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO ₁	1	2				2			3			
	1			2				3	2			
CO ₃				3		2		-	_			3
CO ₄						3						3
			1	– Reaso	nable; 2 ·	– Significo	ant; 3 – Str	rong				
Detailed Cont	tents:			-								
							Meaning c					
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Unit: 2	2						ns, Methoo					
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	2						Distribut					
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Unit: 3	3					sung.					D 1	
Unit: :	3	and Fo	recasting				h Daners	Effective	Technica	1 Writir	ng Devel	oning
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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
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Unit: 4 Unit: 5 Examination	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, 1 PCT. Pattern:	, 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, PO ₃ - usage, PO ₁₀ - Co	11-2022 ning logic. rithms in p a structure for Algon on to solve ctness in es in a p Design/d D esign/d	Inter- problem so s for differ rithms. e problem Algorith problem evelopme gineer an ion, PO 11-	0 (of Exami Maximur ernal Eva End Se Exam D olving rent kind ms. 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, PO 7- E	: : : : : : : : : : : : : : : : : : :	1 Program mes (POs PO ₂ , PO ₄ 2, PO ₄ 3, PO ₅ PO ₉ , PO ₁₂ 4- Condu
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	<u></u>			106	PO ₇	PO ₈	PO ₉	PO ₁₀	РС	D ₁₁ PC
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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	·oval: 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						
Course Objectiv	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 ₁	Understa	and the i	mportan	ce of dat	ta pre-pr	rocessing	before ma	chine lea	rning	P	O 1, P	O 2, PO 5
	modeling											
CO ₂	v		te mach	ine learr	ning tech	iniques to	respective	e		P	O2, P	O ₄ , PO ₅
	problems.											
CO ₃					0 0				า.			, PO 5
CO ₄			arning al	gorithm	s to solv	e problen	ns of variou	IS		P	O 1, P	O ₂ , PO ₃
	complexi											
PO ₁ - Engineering												
problems, PO ₅ - M										PO ₈ - Ethi	cs, PO	9- Individual
or team work, PO1	- Commur	nication, F										
			Mappi	ng of coi	urse outo	comes wit	th program	outcom	es	1		
Course	PO ₁	PO ₂	PO ₂	PO₄	PO₅	POs	PO ₇	PO	PO	PO ₁₀	PO	11 PO12
Course Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	РО	11 PO 12
Outcomes CO ₁	PO ₁	3	PO ₃	PO ₄	2	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	РО	P11 PO ₁₂
Outcomes			PO ₃	PO ₄		PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO	PO12
Outcomes CO ₁		3 3	PO ₃		2	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO	PO12
Outcomes CO1 CO2	2	3	PO ₃		2 3	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO	PO ₁₂
Outcomes CO1 CO2 CO3	2 3	3 3		2	2 3 3		PO ₇		PO ₉	PO ₁₀	PO	PO ₁₂
Outcomes CO1 CO2 CO3	2 3 2	3 3		2	2 3 3				PO ₉	PO ₁₀	PO	PO ₁₂
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; 3 – Stron	g ning syst	cems, C	Goals and	l appl	ications of
Outcomes CO1 CO2 CO3 CO4	2 3 2	3 3 2 Introdu machin	1 -	2 3 Reasona 9 Machir ng in diff	2 3 3 ble; 2 – S ne Learn ferent fie	ignifican ing - Def	t; 3 – Stron fining learn as health c	g ning syst	ems, C king, te	Goals and	l appl	ications of
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conten	2 3 2	3 3 2 Introdu machir market	1 – 2 Iction to the learning and	2 3 Reasona 9 Machir ng in difi so on. 4	2 3 ble; 2 – S ble Learn ferent fie Aspects	ing - Defelds such of develo	t; 3 – Stron 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,
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	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							
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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		-	-	•								
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	ms, PO 5- Mod										PO8- Ethio	cs, PO 9- I	ndividu
or tean	n work, PO 10-	Commun	ication, P										
	-			Марри	ng of cou	irse outc	comes wi	th progra	am outco	mes			1
	Course	PO ₁	PO_2	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁
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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.			_			
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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	oval: 16th	n BoS 17-1			4	0	0		
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	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.
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PO ₁ - Engineering K	differen		lom and		Docion /	dovolonma	nt of colv	tions DO	- Cond	Luot in:		PO11, PO	
problems, PO ₅ - Mo													
or team work, PO ₁₀										, 200			
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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	3 – Stron 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 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	3 - Stron 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
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	de			C	Course T	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.								
Course Objectiv	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.								
To design ar		ent deep	learnin	g algoritl	hms.									
Course Outcome	es (CO):													
COs No.				5	Stateme	nt						ed Prog		
										(comes (l	,	
CO ₁	Able to d											PO1, 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 ₄	Impleme											PO3, PO 4		
problems, PO 5- Me or team work, PO 16	odern tool i o- Commun	usage, PO ication, P	O 11- Proje	ect manag	ement an	r, PO 7- Ên d finance,	PO 12 ⁻ Life	t and susta e-long Lea	ainability, I rning		thics	s, PO 9- Ir	ndividual	
problems, PO ₅ - Mo or team work, PO ₁₀	o- Commun	ication, P	O ₁₁ - Proje Mappii	ng of cou	ement an irse outo	7, PO 7- Ēn [.] d finance, comes wi	vironmen , PO 12- Life th progra	t and susta e-long Lea am outco	ainability, I rning mes	РО 8- Е				
problems, PO 5- Mo or team work, PO 10 Course Outcomes	PO1	usage, PC ication, P PO ₂	O 11- Proje	ect manag	ement an	r, PO 7- Ên d finance,	vironmen P O 12- Life	t and susta e-long Lea	ainability, I rning			s, PO 9- Ir PO 11	ndividual PO ₁₂	
or team work, PO ₁₀	o- Commun	ication, P	O ₁₁ - Proje Mappin PO ₃	ng of cou	ement an irse outo	7, PO 7- Ēn [.] d finance, comes wi	vironmen , PO 12- Life th progra	t and susta e-long Lea am outco	ainability, I rning mes	РО 8- Е				
or team work, PO ₁₀ Course Outcomes	o- Commun	ication, P	O ₁₁ - Proje Mappii	ng of cou	ement an irse outo	7, PO 7- Ēn [.] d finance, comes wi	vironmen , PO 12- Life th progra	t and susta e-long Lea am outco	ainability, I rning mes	РО 8- Е				
Course Outcomes CO ₁	o- Commun	PO ₂	O ₁₁ - Proje Mappin PO ₃ 2 3	PO4	ement an irse outo	7, PO 7- Ēn [.] d finance, comes wi	vironmen , PO 12- Life th progra	t and susta e-long Lea am outco	ainability, I rning mes	РО 8- Е				
Course Outcomes CO ₁ CO ₂	o- Commun	ication, P PO ₂ 1 3	O ₁₁ - Proje Mappin PO ₃ 2 3 3	ect manag ng of cou PO4 2 2	PO5	r, PO 7- Èn d finance, comes wi PO 6	vironmen , PO ₁₂ - Lift th progr. PO ₇	t and susta e-long Lea am outco PO ₈	ainability, I rning mes	РО 8- Е				
Course Outcomes CO ₁ CO ₂ CO ₃	o- Commun	ication, PO ₂ 1 3 2	O ₁₁ - Proje Mappin PO ₃ 2 3 3	ect manag ng of cou PO4 2 2	PO5	7, PO 7- Ēn [.] d finance, comes wi	vironmen , PO ₁₂ - Lift th progr. PO ₇	t and susta e-long Lea am outco PO ₈	ainability, I rning mes	РО 8- Е				
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conten	PO1 1 	PO ₂ 1 3 2 2	O ₁₁ - Proje Mappin PO ₃ 2 3 3 1 - J	PO4 PO4 2 2 Reasonal	PO ₅ PO ₅ 2 ble; 2 - S	r, PO 7- Én d finance, comes wi PO 6 ignifican	vironmen PO ₁₂ - Life th progra PO ₇ t; 3 – Str	t and susta e-long Lea am outco PO ₈	ninability, i rning mes PO ₉	POs- E PO				
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conten Lab experiments	PO1 1 	PO ₂ 1 3 2 2	O ₁₁ - Proje Mappin PO ₃ 2 3 3 1 - J	PO4 PO4 2 2 Reasonal	PO ₅ PO ₅ 2 ble; 2 - S	r, PO 7- Én d finance, comes wi PO 6 ignifican	vironmen PO ₁₂ - Life th progra PO ₇ t; 3 – Str	t and susta e-long Lea am outco PO ₈	ninability, i rning mes PO ₉	POs- E PO				
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conten	PO1 1 	PO ₂ 1 3 2 2	O ₁₁ - Proje Mappin PO ₃ 2 3 3 1 - J	PO4 PO4 2 2 Reasonal	PO ₅ PO ₅ 2 ble; 2 - S	r, PO 7- Én d finance, comes wi PO 6 ignifican	vironmen PO ₁₂ - Life th progra PO ₇ t; 3 – Str	t and susta e-long Lea am outco PO ₈	ninability, i rning mes PO ₉	POs- E PO				
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conten Lab experiments	PO1 1 	PO ₂ 1 3 2 2	O ₁₁ - Proje Mappin PO ₃ 2 3 3 1 - J	PO4 PO4 2 2 Reasonal	PO ₅ PO ₅ 2 ble; 2 - S	r, PO 7- Én d finance, comes wi PO 6 ignifican	vironmen PO ₁₂ - Life th progra PO ₇ t; 3 – Str	t and susta e-long Lea am outco PO ₈	ninability, i rning mes PO ₉	POs- E PO				
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conten Lab experiments 1.	PO1 1 its: s are based	PO2 1 3 2 2 d on the	0 ₁₁ - Proje Mappin PO ₃ 2 3 3 1 - 1 syllabus	PO4 PO4 2 2 Reasonal	PO5 PO5 2 ble; 2 - S bed for 1	r, PO ₇ - En d finance, comes wi PO ₆ ignifican	vironmen , PO ₁₂ - Lift th progra PO ₇ t; 3 – Str	t and susta e-long Lea am outco PO ₈ cong	ninability, i rning mes PO ₉ sing pytl	POs- E PO	10	PO ₁₁	PO ₁₂	
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Conten Lab experiments 1. Examination an	PO1 1 ts: s are based	PO2 1 3 2 2 d on the ion Patt	0 ₁₁ - Proje Mappin PO ₃ 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, PO ₇ - En d finance, comes wi PO ₆ ignifican Deep lear	vironmen , PO ₁₂ - Life th progr. PO ₇ , PO ₇ , rning alg	t and susta e-long Lea am outco PO ₈ cong gorithm u	PO ₉ s) comprise	POs- E PO	10	PO ₁₁	PO ₁₂	
Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ 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 ₁₁ - Proje Mappin PO ₃ 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, PO ₇ - En d finance, comes wi PO ₆ ignifican Deep lear	vironmen , PO ₁₂ - Life th progr. PO ₇ , PO ₇ , rning alg	t and susta e-long Lea am outco PO ₈ cong gorithm u	PO ₉ s) comprise	POs- E PO	10	PO ₁₁	PO ₁₂	
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or team work, PO ₁₀ Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ 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 ₁₁ - Proje Mappin PO ₃ 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, PO ₇ - Én d finance, comes wi PO ₆ ignifican Deep lear	vironmen , PO ₁₂ - Life th progr. PO ₇ , PO ₇ , rning alg	t and susta e-long Lea am outco PO ₈ cong gorithm u	PO ₉ s) comprise	POs- E PO	10	PO ₁₁	PO ₁₂	
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Course Cod			Course TitleLectureInternet of ThingsLT									~	Semester: IV	
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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	
CO ₁ Explain & demonstrate various components of IoT along with Issues and											Ou		es (POs)	
CO ₁	Explain & Challeng			various	compon	ents of	IoT alon	g with Is	ssues an	d		PO ₂	PO4	
CO ₂				e and im	portance	e of IoT i	n the mod	dern worl	d.		Р	O1. P	O ₂ , PO ₅	
		2						T for re		d			O ₃ , PO ₅	
	applicatio		r - F - 500			1					-	, -	-,0	
			y of exist	ting and	develop	ing archi	tecture te	echnologi	es for Io'	Г	Р	O 1, P	D ₂ , PO ₃ ,	
	and to de	escribe a	nd evalu	ate diffe	rent app	lications	of the Io	T.				PO ₄	PO ₁₂	
PO ₁ - Engineering K														
problems, PO ₅ - Mo										PO ₈ -	Ethic	s, PO	- Individua	
or team work, PO 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 ₁	PO ₂								PC	O ₁₀	РО	11 PO ₁₂	
Outcomes			Mappir	ng of cou	irse outo	comes wi	th progra	m outcor	nes	PO	D ₁₀	РО	11 PO ₁₂	
		PO ₂	Mappir	ng of cou PO4	irse outo	comes wi	th progra	m outcor	nes	PO	D ₁₀	PO	11 PO ₁₂	
Outcomes CO ₁	PO ₁	PO ₂	Mappir	ng of cou PO4	rse outc PO₅	comes wi	th progra	m outcor	nes	P	D ₁₀	PO	11 PO ₁₂	
Outcomes CO ₁ CO ₂	PO ₁	PO ₂ 2 2	Mappir PO ₃	ng of cou PO4	PO ₅	comes wi	th progra	m outcor	nes	P	D ₁₀	PO	PO ₁₂	
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Outcomes CO1 CO2 CO3 CO4	PO ₁ 2 3	PO ₂ 2 2 2	Mappin PO ₃ 2 3	ng of cou PO4 2 2	PO ₅	PO ₆	th progra PO ₇	PO ₈	nes	P	D ₁₀	PO		
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Content	PO ₁ 2 3	PO ₂ 2 2 2 2	Mappin PO ₃ 2 3 1 - 1	ng of cou PO ₄ 2 2 Reasonal	PO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO ₆	th progra PO ₇ t; 3 – Stro	PO ₈	PO ₉					
Outcomes CO1 CO2 CO3 CO4	PO ₁ 2 3	PO ₂ 2 2 2 2 Introdu Networ	Mappin PO ₃ 2 3 1 - 1 uction to rking Co	ng of cou PO4 2 2 Reasonal 0 IoT, IO' mmunic	PO ₅ 2 2 ble; 2 - Station Profile	PO6 PO6 ignifican tecture, S	th progra PO ₇ t; 3 – Stro Sensing, <i>F</i>	PO ₈	PO9 PO9	of N	letwo	orkin	g, Basics c	
Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Content Unit: 1	PO ₁ 2 3	PO ₂ 2 2 2 2 Introdu Networ Comm	Mappin PO ₃ 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 ₇ t; 3 – Stro Sensing, <i>F</i>	PO ₈	PO9 PO9	of N	letwo	orkin	2	
Outcomes CO1 CO2 CO3 CO4	PO ₁ 2 3	PO ₂ 2 2 2 2 Introdu Networ Commu	Mappin PO ₃ 2 3 1 - 1 uction to rking Co unication uction to	PO4 PO4 2 2 Reasonal 0 IoT, IO ⁷ 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 ₇ t; 3 – Stro Sensing, A works, M	PO ₈	PO9 PO9 , Basics o	of N	letwo	orking	g, Basics c	
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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 ₂ 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Mappin PO ₃ 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 in ar 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 Id gration ud, Fog C rid, Indus ing, Impl luation (3 evaluatio	PO ₈ PO ₈ 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 ₂ 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Mappin PO ₃ 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 in ar 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 Id gration ud, Fog C rid, Indus ing, Impl luation (3 evaluatio	PO ₈ PO ₈ 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 ₁ 2 3 s: LEvaluati nts/ quiz Things: A et of Thin	PO ₂ 2 2 2 2 2 Introdu Netwoi Commu Introdu I	Mappin PO ₃ 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 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 ₈ PO ₈ PO ₈ 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 _i 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 ₁ 2 3 s: HEvaluati	PO ₂ 2 2 2 2 2 Introdu Netwoi Commu Introdu I	Mappin PO ₃ 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 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 ₈ PO ₈ PO ₈ Actuation achine-to of, Introc 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 _i 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 ₁ 2 3 s: Evaluati ents/ quiz Things: A et of Thin .	PO ₂ 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 ₃ 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 ₈ PO ₈ ong Actuation achine-to oT, Introc of Sensor Computing strial IoT. ementation 30 marks n (70 mar y Madiset	PO ₉ PO ₉ , 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 _i 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 ₃ 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 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 Raspber pberry P d Compu and Anal nected V althcare nclude t entation o bach", 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 ₇ 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	m outcor PO ₈ ong Actuation achine-to oT, Introc of Sensor Computing strial IoT. ementation 30 marks n (70 mar y Madiset es, by Pet	PO ₉ PO ₉ , 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	ation1							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 ₁											PO ₁	
CO2Understand the concept of Sensors, Actuators and Cloud.CO2Understand and create the data acquisition on cloud.											PO ₁ , P	
	CO ₃ Understand and create the data acquisition on cloud CO ₄ Create the IoT applications											PO ₄
CO4Create the IoT applicationsPO1- Engineering Knowledge, PO2- Problem analysis, PO3- Design/development of solutions, PO4- Cond											D ₃ , PO ₄	
PO ₁ - Engineering K problems, PO ₅ - Mo												
or team work, PO ₁₀										FO8- Ethio	.5, FO9-	muiviuuai
,,		,				omes wit						
Course	DO	DO								ЪО	DO	ЪО
Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO ₁	1											
CO ₂	2	2										
CO ₃		2	2	2								
CO ₄			2	2	2							
			1 - 1	Reasonal	ole; 2 – Si	ignificant	;; 3 – Stro	ng				
Detailed Content		f Andrein	o and di	fforant t	mog of A	nduinaa						
 Study and Ins Write progra 						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				
 To understar To familiarize 									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 ₁									ds in rese					, PO 2	
CO_2									duct rese		ı		PO ₃	, PO 5	
									ssertatior						
PO ₁ - Engineering I															
problems, PO ₅ - Mo											у, РО	8- Ethic	s, PC) 9- In	dividual
or team work, PO ₁₀	- Commun	icati							am outcoi						
Course		1		маррп	ig of cou		Unies wi	lii piogia		nes					
Outcomes	PO ₁	P	O 2	PO ₃	PO ₄	PO ₅	PO_6	PO ₇	PO ₈	PO	9	PO ₁₀	PO	O ₁₁	PO ₁₂
CO ₁	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)
CO 1	Understa	and t	he issues & o	challeng	es, goals,	scientif	ic metho	ds in rese	earch.			PO ₁ , PO ₂	2
CO ₂	Prepare	a pro	ject proposa	al (to uno	dertake a	project)	and con	duct rese	arch ir	1		PO ₃ , PO ₃	i
			priate mann										
PO1- Engineering F													
problems, PO ₅ - Mo										у, РО	8- Ethic	s, PO 9- I	ndividua
or team work, PO10	- Commun	icatio											
Course			маррп	ig of cou		omes wi	tn progra	am outco	mes				
Outcomes	PO ₁	PC	PO ₃	PO ₄	PO ₅	PO_6	PO ₇	PO ₈	PO	9	PO ₁₀	PO ₁₁	PO ₁₂
	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 ₁	To under	star	nd the r	researc	ch issues	s & challe	enges, re	esearch g	oals, scien	ntific			PO ₁ , I	PO ₂
	methods						-	-						
CO ₂	To Review	w Li	teratur	re and	Researc	h Papers	; Writing	g Researc	h Papers,	Thesis	5,		PO _{3,} 1	PO ₅
	Reports a	and	Project	t Propo	sals Plag	giarism a	ind Copy	rights.						
PO1- Engineering K														
problems, PO ₅ - Mo											y, PO 8	- Ethic	s, PO 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 ₁	P	O ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO	,	PO 10	РО	11 PO 12
Outcomes		 												
CO ₁	2		2											
CO ₂				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	roval: 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		meinge	ince										
1. To study th		ntelliger	nt agents	and sea	rch meth	nods.							
 To study th To study th 		0	0										
3. To construe		-		-									
4. To study th					8								
Course Outcon													
COs No.					Statem	ent				Ν	lappe	d Pr	ogram
													(POs)
CO ₁	and reas	oning te	chniques	5	•		g knowled				PC	D ₁ , P	O ₂
CO ₂					is in di	fferent d	omains su	ich as r	nedicin	e,	PC) ₂ , P	O ₃
	engineer	0			1 - 1 - 1 0		11.11						
CO ₃		e			-		ilding expe	e e		1 -) ₄ , P	
CO ₄	Understa deploym	anding o	t the eth	nical and	l legal co	onsiderati	ons in the	developr	nent an	d	PO 4, I	P O 9,	PO ₁₀
PO ₁ - Engineering problems, PO ₅ - M or team work, PO	Aodern too	l usage, P	0 6- The 6 PO 11- Pro	engineer a ject mana	and societ gement a	ty, PO 7- Er nd finance	vironment a	and sustair long Learr	nability, I ling				
Course			· · ·									~	
Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO_6	PO ₇	PO ₈	PO ₉	PO ₁₀	Р	O ₁₁	PO ₁₂
CO ₁	3	2											
CO ₂		2	2										
CO ₃				2	2					0			
CO ₄				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 me	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						
7 7 1							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	TI		eme	ster: II
Version: 1.2	0.1	67. /		e of App	roval: 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 ₁						limits of	the intellig	ent syste	ms.)1, P (
CO ₂	Analyze t	1		0,	0							2, P	
CO ₃												4, P	
CO ₄	agents to them	handle					-		-				PO ₁₀
PO ₁ − Engineering problems, PO ₅ − M or team work, PO ₅	odern too	l usage, P	O ₆ - The e PO ₁₁ - Pro	engineer a ject mana	and societ	y, PO 7- En nd finance	vironment a	and sustair long Learn	nability ing				
Course													
Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	P	011	PO ₁₂
CO1	3	2	-								_		
		2	2	0	0								
CO ₃ CO ₄				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		Biolog i Hebb's Algorit	i cal Four Rule, hms: Cre	ndations Single ossover,	to Inte &Multi- Mutatio	lligent Sy layer Pe n, Select	v stems : 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 tern: 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 th ed., Pearsons, 2022
Refe	rence Books:
1	Adrian A. Hopgood, "Intelligent systems for engineers and scientists", 4 th 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 ₁	Understa	and the b	pasics of	social ne	etwork a	nalysis.					PO ₁	, PO ₂
CO_2	Analyze	Ontology	y represe	ntation	of social	network	data.				PO_2	, PO ₃
CO ₃	Apply su	pervised	and uns	upervise	d algorit	hms on so	ocial netwo	orks.			PO ₄	, PO ₅
CO ₄	Interpre	t the sen	nantic co	ntent of	social m	edia data.				P	O 4, P	O9, PO10
PO1- Engineerin												
problems, PO5-										PO ₈ - Ethi	cs, PO	9- Individua
or team work, P	0 ₁₀ - Commu	inication,										
Course			марр	ing of co	ourse out	comes wi	ith progran	n outcom	es			
Outcomes	PO ₁	PO_2	PO ₃	PO_4	PO ₅	PO_6	PO ₇	PO ₈	PO ₉	PO ₁₀	PO	P11 PO ₁₂
	3	2										
	5	2	2									
CO3				2	2							
CO ₄												
				2					2	3		
			1 -	-	ıble; 2 – 1	Significan	ıt; 3 – Stroi	ng	2	3		
Detailed Conto	ents:			Reasona		* *		•				
	ents:		DUCTIO	Reasona	oduction	to Web	-Limitati	ons of c	urrent	Web -		-
Detailed Conte		Seman	DUCTIO 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	DUCTIO 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
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Detailed Conte		Seman Netwo networ networ MODE	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	-Limitati Web -Sta Network S -Blogs	ons of c atistical P Analysis and onl REPRES	urrent Properti -Key co ine co ENTAT	Web – ies of Sc oncepts mmunit ION: On	ocial M and n ies -' tology	Vetworks neasures in Web-base y and thei
Detailed Conte		Seman Netwo networ networ MODE 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 DWLEDGE ed knowled	ons of c atistical P Analysis and onl REPRES dge Repre	urrent Properti -Key co ine co ENTAT	Web – ies of So oncepts ommunit ION: On	tology	Vetworks neasures in Web-base y and thei y language
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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 ATING 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 DWLEDGE ed knowled cription Fr twork dat	ons of c atistical P Analysis and onl REPRES 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 ION: 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
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Detailed Conto Unit:	2	Seman Netwo networ MODE role in for the Modeli represe of soc represe ALGOI 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 OWLEDGE ed knowled cription Fr twork dat on of socia d reasonin Association Learning,	ons of c atistical P Analysis and onl REPRES dge Repre- amework ca: State d individu ng with s Markov r	eurrent Properti -Key co ine co ENTAT esentat c -Web -of-the alls -On ocial n Mining models,	Web – ies of So oncepts mmunit ION: 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 MODE role in for the Modeli represe of soc represe ALGOF 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 DWLEDGE ed knowled cription Fr twork date on of social d reasoning Association Learning, orative Filt	ons of c atistical F Analysis and onl REPRES 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 ION: 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 MODE role in for the Modeli repress of soc repress ALGOI 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 OWLEDGE ed knowled cription Fr twork date on of social d reasonin Association Learning, orative Filt	ons of c atistical P Analysis and onl REPRES 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 ION: 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 MODE role in for the Modeli repress of soc repress ALGOI 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 DWLEDGE ed knowled cription Fr twork date on of social d reasoning Association Learning, orative Filt	ons of c atistical P Analysis and onl REPRESI dge Repre- camework ta: State il individu ng with s Markov n tering Re ks, the Ex CTWORKS	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 ION: 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
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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		
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	f Periods		Hrs.						/laximu			:	100
Perioc	s/Week	: 4						Inte	ernal Ev			:	30
T , , , ,	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
 To be able interaction To be fami virtual and To underst 	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												
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CO ₂	•	o evalua	0 0	nalyze ι	user inte	rfaces us	ing approp	oriate me	trics a	nd		PO ₂ ,	PO ₃
CO ₃		anding o					ce design i	n HCI an	d how	to		PO ₄ ,	PO ₅
CO ₄		ty with	emergin	ıg techn	ologies	and trend	ls in HCI, ed reality	such as	machi	ne	PC) 4, P (D 9, PO 10
		- D O D	nahlam ar	alvaia D				tions DO	Candi	ent inve	octic	otiona	of complex
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	Aodern too	l usage, P	0 6- The 6 PO 11- Pro	engineer ject mana	O₃- Design and socie agement a	n/developi ty, PO 7- Er nd finance	nent of solu wironment : , PO 12- Life-	and sustain long Learr	nability, ning		Ethic		- Individual
or team work, PC	Modern too D ₁₀ - Commu	l usage, P nication,	O ₆ - The e PO ₁₁ - Pro Mapp	engineer ject mana oing of co	O ₃ - Design and socie agement a ourse ou	n/developi ty, PO 7- Er nd finance tcomes w	nent of solu wironment a , PO₁₂- Life- ith program	and sustain long Learr n outcom	nability, ning nes	PO ₈ -]	Ethic	s, PO s	- Individual
or team work, PC Course Outcomes	Aodern too D ₁₀ - Commu PO ₁	l usage, P nication, PO ₂	O ₆ - The e PO ₁₁ - Pro Mapp	engineer ject mana oing of co	O ₃ - Design and socie agement a ourse ou	n/developi ty, PO 7- Er nd finance tcomes w	nent of solu wironment a , PO₁₂- Life- ith program	and sustain long Learr n outcom	nability, ning nes	PO ₈ -]	Ethic	s, PO s	- Individual
or team work, PC Course Outcomes CO ₁ CO ₂ CO ₃	Aodern too D ₁₀ - Commu PO ₁	PO ₂	PO ₆ - The e PO ₁₁ - Pro Mapp PO ₃	engineer ject mana oing of co	O ₃ - Design and socie agement a ourse ou	n/developi ty, PO 7- Er nd finance tcomes w	nent of solu wironment a , PO₁₂- Life- ith program	and sustain long Learr n outcom	nability, ning nes	PO ₈ - 1	Ethic	s, PO s	- Individual
Course Outcomes CO ₁ CO ₂	Aodern too D ₁₀ - Commu PO ₁	PO ₂	06- The 6 PO ₁₁ - Pro Mapp PO ₃ 2	engineer ject mana ing of co PO ₄ 2 2	D ₃ - Design and socie agement a ourse ou PO ₅	n/developn ty, PO 7- Er nd finance tcomes w PO 6	nent of solu vironment : , PO ₁₂ - Life- ith program PO ₇	and sustain long Learr n outcom PO ₈	nability, ning nes	PO ₈ -]	Ethic	s, PO s	- Individual
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or team work, PC Course Outcomes CO ₁ CO ₂ CO ₃	Aodern too D ₁₀ - Commu PO1 3	PO2	PO ₆ - The o PO ₁₁ - Pro Mapp PO ₃ 2 1-	PO4 PO4 2 2 Reason	D ₃ - Design and socie agement a ourse ou PO ₅ 2 able; 2 -	n/developn ty, PO 7- Er nd finance tcomes w PO 6 Significar	nent of solu avironment ; , PO ₁₂ - Life- ith program PO 7 PO 7	and sustain long Learr n outcom PO ₈	PO9	PO ₈ - 1	Dio	PO:	- Individual
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or team work, PC Course Outcomes CO1 CO2 CO3 CO4 Detailed Conte Unit: 1	Aodern too D ₁₀ - Commu PO ₁ 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphid Interfa Design human Design orderin compo simply	PO ₆ - The o PO ₁₁ - Pro Mapp PO ₃ 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 ₁₂ - Life- ith program PO ₇ PO 7 ce - 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 ₈ rg tion, imp e graphic nical syst ser interi ers, impo understar purpose navigation ad empha	PO ₉ PO ₉ 2 ortance cal user em, Ch face. rtance nding b e, orga n and asis –	PO ₈ - 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 ₁₀ - Commu PO ₁ 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphie Interfa Design human Design orderin compo simply consid Windo	PO ₆ - The o PO ₁₁ - Pro Mapp PO ₃ 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 ₃ - Design and socie agement a ourse our PO ₅ 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, PO 7- Er nd finance tcomes w PO 6 Significan er Interfa- of Screen manipula stics- Prir action wit nteraction reen pla content rmation re n. schemes	nent of solu vironment : , PO ₁₂ - Life- ith program PO ₇ PO ₇ tith group t ; 3 - Stro ce - defini design. The tion, graph ciples of u h compute h speeds, u 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 ₈ - 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 ₁₀ - Commu PO ₁ 3 	I usage, P nication, PO2 2 2 2 Introdu of good graphie Interfa Design human Design orderin compo simply consid Windo screen	PO ₆ - The o PO ₁₁ - Pro Mapp PO ₃ 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 ₃ - Design and socie agement a ourse our PO ₅ 2 able; 2 - ce of use f history of direct naracteris an intera Human i als – Sc ata and t of infor y – infor ace design avigation Compor	n/develop ty, PO 7- Er nd finance tcomes w PO 6 Significan er Interfa- of Screen manipula stics- Prir action wit nteraction reen pla content rmation re n. schemes nents – te	nent of solu vironment : , PO ₁₂ - Life- ith program PO ₇ PO ₇ tith group t ; 3 - Stro ce - defini design. The tion, graph ciples of u h compute h speeds, u 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 ₈ - 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 ₁₀ - Commu PO ₁ 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 ₆ - The e PO ₁₁ - Pro Mapp PO ₃ 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; 2 -</i> <i>able; 2 - </i> <i>able; 2 - <i>able; 2 - </i> <i>able; 2 - </i> <i>able; 2 - </i> <i>able; 2 - </i> <i>able; 2 - </i> <i>able</i></i>	n/developi ty, PO 7- Er nd finance tcomes w PO 6 Significan 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 ₁₂ - Life- ith program PO ₇ PO ₇ 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 on trieval selection ext and means	PO ₈ PO ₈ mg tion, imp e graphic nical syst ser interf ers, impo understar purpose navigation ad empha web – sta	PO9 PO9 2 cortance cal user em, Ch face. rtance nding b e, orga n and asis – itistical w, selec ons and	PO ₈ - 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 ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1	Aodern too D ₁₀ - Commu PO ₁ 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 ₆ - The e PO ₁₁ - Pro Mapp PO ₃ 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 ₁₂ - Life- ith program PO ₇ PO ₇ PO ₇ et; 3 - Stro ce - defini design. Th tion, graph ciples of u h compute n speeds, u nning and - screen trieval on selection ext and mes	PO ₈ PO ₈ routcom PO ₈ routcom PO ₈ routcom routcom PO ₈ routcom	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 ₈ - 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 ₁ CO ₂ CO ₃ CO ₄ Detailed Conte Unit: 1 Unit: 2	Aodern too D ₁₀ - 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 prototy	PO ₆ - The o PO ₁₁ - Pro Mapp PO ₃ PO ₃ 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 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 ₁₂ - Life- ith program PO ₇ PO ₇ PO ₇ 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	nd sustain long Learr n outcom PO ₈ possibility provide a state purpose navigation ad empha web – state purpose navigation ad empha seages, Ic	nability, ing ies PO ₉ 2 ortance cal user em, Ch face. rtance iding b e, orga n and asis – itistical w, select ons and engine cionale	PO ₈ - 1 PO 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 ₁₀ - 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 ₆ - The o PO ₁₁ - Pro Mapp PO ₃ PO ₃ 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 Reason 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- sign Foo ty Stand	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 ₁₂ - Life- ith program PO ₇ PO ₇ PO 7 PO 7 CE - definite design. The tion, graph aciples of us h compute a speeds, us nuning and - screen - focus and trieval on selection a selection a sele	PO ₈ PO ₈ PO ₈ routcom PO ₈ routcom PO ₈ routcom PO ₈ routcom ro	nability, ing ies PO ₉ 2 ortance cal user em, Ch face. rtance iding b e, orga n and asis – itistical w, selec ons and engine ionale patter	PO ₈ - 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	roval: 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 ₁	Define d	ata and t	ext mini	ng conce	epts and	technique	es					PO ₂
					-		ocessing t	ho data h	oforo			PO ₃
	mining	onection	i oi uata		iniques i	or pre-pr	ocessing t	ne uata D	elore		PO ₂	FU3
<u> </u>	0	a data a	ndtout	mining	a dala ta	a altra pro	hlomahri	tra atina	~		DO	DO
CO ₃	knowled			nnnng n	ioueis to	solve pro	blems by e	extracting	3		PU 4	PO 5
<u> </u>							1	. 1.1.1.		D(<u> </u>	
CO ₄	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 ₁ - Engineering	Knowledg	e, PO 2- Pi	roblem an	halysis, PC) ₃ - Design	1/developr	nent of solu	tions, PO 4	- Condu	ct investig	gations	of comple
problems, PO ₅ - M or team work, PO										PO ₈ - Ethio	cs, PO	- maiviau
of team work, PC	10 ⁻ Commu	meation,					th program					
Course			марр	ning of CC	Juise out	LCOMES WI	iui prograi		les			
Course	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO	
Outcomes			-			-			_			
CO ₁	3	2										
CO ₂		2	2									
CO ₃				2	2							
CO ₄				2					2	3		
			1 -	Reason	able; 2 – 1	Significan	nt; 3 – Stro	ng				
Detailed 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.											
Course Outcom	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 ₁ , P	$\mathbf{O}_2, \mathbf{PO}_2$		
CO ₃		<u> </u>		rtance c	fVR & AI	? in the m	odern wo	rld		D)° D	04, PO		
CO ₄							nd the ch		faced			PO ₁₂		
PO ₁ - Engineering										ict investi				
problems, PO5- M	lodern tool	usage, P	3 6- The e	ngineer a	nd societ	y, PO 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 ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO_6	PO ₇	PO ₈	PO ₉	PO ₁₀	PC	11 PC		
Outcomes	2	2	3											
CO ₁ CO ₂	3	2	3		2									
CO ₂	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	T aa a a a	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. tern: 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 gmentee 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	nd Evalua	Exercis Augme differen Augme in edu trackin system tion Pat	nted and nce bet nted rea cational g for au s. tern: 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.	nd Evalua	Exercis Augme differen Augme in edu trackin system tion Pat	nted and nce bet nted rea cational g for au s. tern: 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:	nd Evalua 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. tern: 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		
Examination ar exams/ assignm examination.	nd Evalua 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. tern: 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	Course Title Lect												
MTCS222PI		Pattern Matching and Object Recognition									Р	Sem	ester: II	
Version: 1.2					0	h BoS 17-1	0		3	1	0			
	Scheme	of Instru				Scheme of Exam					n	1		
No. of	Periods		Hrs.				m Sco	ore	:	100				
Periods	/ Week	: 4 In					Inte	ernal Ev	aluati	on	:	30		
	Credits	: 3 End S							End S	Semester : 70			70	
Instructio	n Mode													
Prerequisite(s): N	lathemat	: LectureExam Duration: 3 Hrs.cs and Machine Learning												
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 ₁	Understa	and the	concep	tofa	pattern	and the	basic ap	proach 1	to the			PO ₁		
	developm	nent of	pattern	recogni	tion and	machine	e intellige	ence algo	rithms					
	and appli	ications	of PR sys	stem.				-						
CO ₂	Demonst	rate the	basic m	ethods of	of featur	e extracti	ion, featu	re evalua	tion,		J	PO ₂ , PC	4	
	analyze a	nd relat	e researe	ch in the	pattern	recogniti	on area.							
CO ₃					pervised	classifica	tion metl	nods to d	evelop		РО	3, PO5,	PO ₉	
CO ₄	2			em in real-world data.									PO ₅	
			pattern recognition techniques to real-world problems such as tection and recognition and to implement simple patternPO3, PO4, PO5											
	object d	letectior	n and 1	recogniti	ion and		lement	simple p	attern					
PO 1- Engineering K	object c classifier nowledge,	letectior s, classif PO 2- Pro	n and 1 fier comb oblem ana	recogniti oinations lysis, PO 3	ion and s, and str - Design/	to imp ructural pa /developm	olement attern rec ent of solu	simple p cognizers itions, PO 4	attern - Condu					
PO₁- Engineering K problems, PO₅- Mo	object c classifier nowledge, dern tool u	letectior <u>s, classif</u> PO 2- Pro 1sage, PO	n and r fier comb oblem ana 06- The en	recogniti <u>pinations</u> lysis, PO 3 ngineer ar	ion and s, and str - Design, nd society	to imp ructural pa /developm 7, PO 7- Env	olement attern rec ent of solu rironment	simple p cognizers itions, PO 4 and sustaii	attern - Condu nability, 1					
PO 1- Engineering K problems, PO 5- Mo	object c classifier nowledge, dern tool u	letectior <u>s, classif</u> PO 2- Pro 1sage, PO	n and 1 <u>fier comb</u> oblem ana 0 6- The en 10 11- Proje	recogniti <u>pinations</u> lysis, PO 3 ngineer ar ect manag	ion and s, and str - Design nd society gement an	to imp ructural pa /developm /, PO 7- Env d finance,	olement attern ree ent of solu ironment PO 12- Life-	simple p cognizers itions, PO 4 and sustain long Learr	attern - - Condu nability, I					
PO ₁- Engineering K problems, PO ₅- Mo or team work, PO 10	object c classifier nowledge, dern tool u	letectior <u>s, classif</u> PO 2- Pro 1sage, PO	n and 1 <u>fier comb</u> oblem ana 0 6- The en 10 11- Proje	recogniti <u>pinations</u> lysis, PO 3 ngineer ar ect manag	ion and s, and str - Design nd society gement an	to imp ructural pa /developm 7, PO 7- Env	olement attern ree ent of solu ironment PO 12- Life-	simple p cognizers itions, PO 4 and sustain long Learr	attern - - Condu nability, I					
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PO ₁ - Engineering K problems, PO ₅ - Mo or team work, PO ₁₀ 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, PO 7- Env d finance, comes wit	olement attern red ent of solu ironment PO 12- Life- h program	simple p cognizers itions, PO 4 and sustain long Learr m outcom	attern - Condu nability, I ning nes	РО 8- Е	thic	s, PO 9-	Individua	
PO ₁ - Engineering K problems, PO ₅ - Mo or team work, PO ₁₀ - Course Outcomes CO ₁	object of classifier nowledge, dern tool u - Commun	letectior s, classif PO ₂ - Prc usage, PO ication, P PO ₂	n and 1 <u>fier comb</u> bblem ana 06- The en 011- Proje Mappin	recogniti Dinations lysis, PO agineer ar act manag ng of cou PO 4	ion and s, and str - Design nd society ement an irse outc	to imp ructural pa /developm v, PO 7- Env d finance, comes wit	olement attern red ent of solu ironment PO 12- Life- h program	simple p cognizers itions, PO 4 and sustain long Learr m outcom	attern - Condu nability, I ning nes	РО 8- Е	thic	s, PO 9-	Individua	
PO ₁ - Engineering K problems, PO ₅ - Mo or team work, PO ₁₀ . Course Outcomes CO ₁ CO ₂	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, PO 7- Env d finance, comes wit	olement attern red ent of solu ironment PO 12- Life- h program	simple p cognizers itions, PO 4 and sustain long Learr m outcom	- Condu - Condu nability, 1 ning nes PO 9	РО 8- Е	thic	s, PO 9-	Individua	
PO ₁ - Engineering K problems, PO ₅ - Mo or team work, PO ₁₀ Course Outcomes CO ₁ CO ₂ CO ₃	object of classifier nowledge, dern tool u Commun	letectior s, classif PO ₂ - Prc usage, PO ication, P PO ₂	n and n fier comb oblem ana 0 ₆ - The en O ₁₁ - Proje Mappin PO ₃ 2	recogniti Dinations lysis, PO ₃ ngineer ar ect manag ng of cou PO ₄	ion and str - Design, - Design, d society ement an 1rse outco PO5 2	to imp ructural pa /developm v, PO 7- Env d finance, comes wit	olement attern red ent of solu ironment PO 12- Life- h program	simple p cognizers itions, PO 4 and sustain long Learr m outcom	attern - Condu nability, I ning nes	РО 8- Е	thic	s, PO 9-	Individua	
PO ₁ - Engineering K problems, PO ₅ - Mo or team work, PO ₁₀ . Course Outcomes CO ₁ CO ₂	object of classifier nowledge, dern tool u Commun	letectior s, classif PO ₂ - Prc usage, PO ication, P PO ₂	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, PO ₃ ngineer ar ect manag ng of cou PO ₄ 1 1	ion and s, and str - Design/ nd society rement an urse outco PO5 2 2	to imp ructural pa /developm d, PO 7- Env d finance, , comes wit PO 6	ent of solu ent of solu ironment PO ₁₂ - Life- h program PO ₇	simple p cognizers itions, PO 4 and sustain long Learr m outcom PO 8	- Condu - Condu nability, 1 ning nes PO 9	РО 8- Е	thic	s, PO 9-	Individua	
PO ₁ - Engineering K problems, PO ₅ - Mo or team work, PO ₁₀ - Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄	object of classifier nowledge, dern tool u - Commun PO ₁ 2	letectior s, classif PO ₂ - Prc usage, PO ication, P PO ₂	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, PO ₃ ngineer ar ect manag ng of cou PO ₄ 1 1	ion and s, and str - Design/ nd society rement an urse outco PO5 2 2	to imp ructural pa /developm v, PO 7- Env d finance, comes wit	ent of solu ent of solu ironment PO ₁₂ - Life- h program PO ₇	simple p cognizers itions, PO 4 and sustain long Learr m outcom PO 8	- Condu - Condu nability, 1 ning nes PO 9	РО 8- Е	thic	s, PO 9-		
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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 ₁ 2	Introdu Classifi PO ₂ - Pro Usage, PO Ication, P PO ₂ 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, PO ₃ ngineer ar ect manag ng of cou PO ₄ 1 1 Reasonal o Patter ision Tre inquiry- Boundary	ion and s, and str - Design/ nd society rement an irse outco PO5 2 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 ₆ 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 ₉ 1 - etting c ests-Bay e Classif t Vecto	POs- E PO pour fe vesian iers. r Mac	10 eet De	PO ₁₁ PO ₁₁ wet w ecision	PO12	
PO ₁ - Engineering K problems, PO ₅ - Mo or team work, PO ₁₀ - Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Content Unit: 1	object of classifier nowledge, dern tool u - Commun PO ₁ 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 ana oblem ana oblem ana oblem ana oblem and oblem 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, PO 7- Env d finance, , comes wit PO 6 ignificant 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: erceptrone	simple p cognizers itions, PO 4 and sustain long Learr n outcom PO 8 sifiers G dom Fore riminative sian Deci	attern - Condu ability, - ing ees PO ₉ 1 - etting of ests-Bay e Classift t Vecto sion Th	PO ₈ - E PO	10 eet De	PO11 PO11 wet w ecision es, Par	PO ₁₂ ith rea Theory	
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PO ₁ - Engineering K problems, PO ₅ - Mo or team work, PO ₁₀ - Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Content Unit: 1 Unit: 2 Unit: 3	object of classifier nowledge, dern tool u - Commun PO ₁ 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 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 <u>ructural p</u> /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 lension Re Compone K-Means.	simple p cognizers itions, PO4 and sustain long Learr n outcom PO8 g sifiers G dom Fore riminative sian Deci arameter lethods H eduction. expectat	attern - Condu hability, j ing PO9 PO9 1 	PO ₈ - E PO PO pur fe vesian iers. r Mac eory. ation. g the er Lir	eet Deet Na eet Na	PO ₁₁ PO ₁₁ 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 Jaage, PO Jaage, 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 ₈ - E PO PO PO PO FO PO FO FO FO FO FO FO FO FO FO FO FO FO FO	thic:	s, PO ₉ - PO ₁₁ PO ₁₁ exection es, Par on-Par ata for Discri n, Mea	Individua PO12 PO12 ith real Theory ametric ametric Latent minant, n Shift	
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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	roval: 161	h BoS 17-		~ 1	4	0	0		
NT-		of Instr					2	Scheme o					00
	of Periods ls/Week		Hrs.			Maximum Internal Evalu							100 30
Period	Credits	: 4	4 Internal Evaluation 4 End Ser										70
Instruct			ture						Durati			3 Hrs.	
Instruction Mode : Lecture Exam Du Prerequisite(s): Artificial Intelligence, Linear Algebra, Vector Calculus, Data Structures and Progr												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						
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Course Outcon	nes (CO):												
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CO ₂							n related					\mathbf{PO}_2 ,	PO ₃
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	motion a					1		1				DO	
CO ₃	-	-			Ũ		mputer visi					PO ₄ ,	
CO ₄		0	exposure	e to obje	ect and s	scene rec	cognition a	ind categ	orizati	on	PO	94, PO	9, PO 10
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problems, PO ₅ -1													
or team work, P										100 1		., - 05	mainada
							ith prograr						
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Outcomes			103	104	103	100	10/	10.	105	10	10	101	1012
CO ₁	3	2											
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CO ₄				-	11.0	ac.	(2	3			
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T T *4 . 4	.								ure, us	sing C	V IP	tools	, Feature
Unit: .	Unit: 3 Feature extraction, shape, histogram, color, spectral, texture, usin analysis, feature vectors, distance /similarity measures, data preproce												
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							PCA, LDA, I						ls.
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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,
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	ry of Com	outer Vis	sion and	Image P	rocessing	v. by Fishe	er et al						
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Course						Course '					cture	-	~	
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Version: 1.2	Cabar	f	Teo and an		e of App	roval: 161	th Bos 1/-		1-1	-	-	•		
No	of Period	-	of Instruction Scheme of Examination : 60 Hrs. Maximum Score :										100	
	ods/Wee		: 4 Maximum S										30	
FCIR	Credit		4						me	End S				<u> </u>
Instruc			-	ture						Exam I				3 Hrs.
Instruction Mode : Lecture Exam Du Prerequisite(s): Artificial Intelligence									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)													
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	and re			1f - 141	4h a - 41	:	idaacti-	a tarre 1 - 1		1	-			DO
CO_2								s involved sparency.	III AI deve	eiopme	IIL		PO ₂ ,	PU3
CO ₃								ng AI system	ma to ona	uro the	ir		PO ₄ ,	DO-
CO_3	reliabi					esting an	iu veriryii	ig Ai syste		uie uie	.11		гО ₄ ,	FU5
CO ₄					bne le	regulat	tory fra	neworks	surround	ling th	1e	PC), P(D ₉ , PO ₁₀
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problems, PO ₅ - or team work, I Course Outcomes CO ₁	PO10- Com	ool us nunic	age, P ation, PO ₂ 2	0 ₆ - The e PO ₁₁ - Pro Mapp PO ₃	engineer a ject mana ing of co	and societ agement a ourse out	ty, PO 7- En nd finance tcomes w	vironment a , PO 12- Life- ith program	and sustair long Learn n outcom	nability, ing es	PO 8- E	Ethic	es, PO 9	- Individu
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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

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	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

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MTCS331PI	ET			Artifici	al Neura	l Network			L	T P	Seme	ster: III
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COs No.	5 (00).			S	tatemen	t				Man	ped Pro	gram
0001101				2							comes (
CO ₁	Identify t	he neura	al netwo	rk algori	thms.						PO ₁ , PO ₂	
CO ₂						n on the a	vailable	data set.			PO ₃ , PO ₅	
CO ₃	117	,			0	and solve			ems.		PO ₃ , PO ₅	;
CO ₄	Perform	evaluatio	on of neu	iral netw	ork algo	rithms.		*			PO ₄ , PO ₅	
PO1- Engineering K	nowledge,	PO ₂ - Prol	olem anal	ysis, PO 3-	· Design/	developme						
problems, PO ₅ - Mo										PO ₈ - Ethio	es, PO 9- I	ndividua
or team work, PO10	- Communi	cation, P										
Course			маррп	ig of cou		omes witł	i prograi	II outcom	es			
Outcomes	PO ₁	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO ₁	2	2										
	2	2	2		1							
CO ₃			2		2							
CO4			-	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 neura	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,
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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
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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 Examination and		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 prunin</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
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Version: 1.2	<u> </u>				e of App	roval: 16	th BoS 17-		~ 1	4	0 0			
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Course Objec	1													
	uce big da	ta an	d HE	DFS.										
	t knowled				Reducer	.								
3. To provid	le the con	cepts	of N	oSQL an	d Mongo	oDB.								
4. To introd	uce progr	ammi	ng to	ools PIG	and HIV	E in Had	oop echo	system.						
Course Outco	omes (CO)													
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					- 1 - 4	0					0	utcom		
CO ₁				lysis in H	-		rk.					PO ₁ ,		
CO_2		-		s using N	1							PO ₂ ,		
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CO ₄			-	-		-	ig and Hiv					O4, PC		
PO1- Engineerin														
problems, PO ₅ -											PO8- Ethi	cs, PO 9	- Indi	ividua
or team work, I		iunica	tion,					ith program						
Course												1		
Outcomes	PO ₁	P	O 2	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO	1	PO ₁₂
CO ₁	3		2											
CO ₂														
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CO ₂			2	2	2	2								
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CO ₃ CO ₄			2		2		Significar	1t; 3 – Stro	ng	2	3			
CO ₃	tents:			1-	2 Reason	able; 2 –	0 0	·	U					C 10
CO ₃ CO ₄	tents:	In	trod	1 - uction to	2 Reason Big Da	able; 2 – ta: Big D	ata Impor	tant, Big D	ata Soluti	ion, Big		e Case	s: IT 1	for IT
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CO ₃ CO ₄ Detailed Cont		In Lc Th	trod g An ie Ha	1 - uction to alytics, t adoop D	2 Reason Big Da he Frauc istribute	able; 2 – ta: Big D d Detecti ed Files	ata Impor ion Patter system: T	tant, Big D n, Social M 'he Design	ata Soluti Iedia Patt of HDFS	ion, Big ern. , HDFS	Data Use Concept	ts, Blo	cks, 1	Name
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	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 Ex	valuation 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 "U	adoon: The Definitive Cuide" Fourth Edition, O'Peilly Media Inc. 2015

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

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		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.

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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	e repres	entation	ı, inferen	ce, and re	elations t	o the arti	ficial inte	lligence.		
Course Outcomes	s (CO):											
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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.

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Prerequisite(s): Di		athema	tics and S	statistics								
Course Objectives		1	1	1 .	1.1	1.0 1						
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	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	oval: 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	y									
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.						
Course Outcome	s (CO):											
COs No.				S	Statemer	nt					pped Pr	
			-								tcomes	· /
CO ₁	Apply the					. 6				P	O1, PO2,	
	Apply the				-	atform.					PO_4, P	
CO ₃ CO ₄	Apply the					dtochnic	al gapa a	xisting be	twoon		PO ₄ , P PO ₁ , P	
CO_4	theory a	5			0		ai gaps e	ansung be	tween		$\mathbf{PO}_1, \mathbf{PO}_2$	03
PO 1- Engineering K						/developm	ent of sol	utions. PO4	- Condu	t t invest	igations	of complex
problems, PO5- Mo	dern tool ı	usage, PO	6- The er	igineer ar	nd society	, PO 7- Env	ironment	and sustain	nability, 1			
or team work, PO10	- Commun	ication, P										
		1	Маррії	ng of cou	irse outc	omes wit	h progra	m outcom	nes	r	- <u>r</u>	
Course	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
Outcomes CO ₁	3	2	2									
CO ₁	3	2	2	2	2							
<u> </u>				2	2	2						
CO4	3		2			-						
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Detailed Content	ts:						·	Ū				
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Unit: 1								d Euler's t				
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51						nding mor		, 21			, L	
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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
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Unit: 4								ctional Fe				
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		on Eth	ereum.			-						
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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 C					Course '					cture		_	
MTCS342	PET					omputing			L		Р	Seme	ester: III
ersion: 1.2				e of App	roval: 161	th BoS 17-			4	v	0		
		of Instr						Scheme o					
	of Periods	: 60	Hrs.						<i>l</i> aximu				00
Period	ls/ Week	: 4						Inte	rnal Ev				80
	Credits	: 4								emeste			0
	ion Mode		ture						Exam I	Duratic	n	: 3	8 Hrs.
Prerequisite(s)		Intellige	nce										
Course Object													
Familiarize and medic Introduce image segi	al settings students t nentation,	o the me feature	ethods ar extractio	nd algori on, and r	thms use nachine	ed in imag learning t	ge processi echniques	ng, analys	sis, and	interp	ret	ation, i	ncludin
 Enable stu drug disco 							eal-world	problems	in bio	nedica	l re	search	, such a
. Develop st							rough the	analysis o	of comp	lex bio	olog	ical im	ages an
the develo							U	2	1		0		0
Course Outcor			0										
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													s (POs)
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CO ₂	Students	should	be ab	le to a	pply var	rious ima	age proce	ssing teo	chnique	es,		PO ₂ , I	PO 3
							chine leari					,	
	analyze a					,		0 0	,				
CO ₃	Students	should	be pro	oficient	in usin	g softwa	re tools a	and prog	rammi	ng		PO ₄ , 1	P O 5
	language	s such a	s MATLA	AR Duth	on and I	madelta	imploment	image pr	ncessi	าต			
	language	o buen u	5 IVII II LI	ab, i yun	on, and i	mages to	impiement	milege pi	occosh	-8			
	and anal			AD, I yun	on, and n	mages to	implement	ininge pi	000331	-8			
CO ₄	and anal	ysis algo	rithms.			Ũ	teams ar	0.1		Ŭ	РО	04, PO 9	o, PO 10
CO ₄	and anal Students research	ysis algo should projec	rithms. be able	e to wo	ork effec	ctively in	-	id collab	orate (on	PO	04, PO9	o, PO ₁₀
	and anal Students research techniqu	ysis algo should projec es.	rithms. be able ts that	e to wo involve	ork effec the ap	ctively in oplication	teams ar of Bio-i	nd collab mage Co	orate o omputi	on ng			
?O₁ - Engineerin	and anal Students research techniqu g Knowledg	ysis algo s should projectes. e, PO 2- Pr	rithms. be able ts that roblem an	e to wo involve nalysis, P 0	ork effec the ap 03- Design	ctively in oplication	teams ar of Bio-i ment of solu	id collab mage Co tions, PO ₄	orate o omputi - Condu	on ng loct inves	stiga	ations o	of comple
PO 1- Engineering problems, PO 5- 1	and anal Students research techniqu g Knowledg Modern too	ysis algo should projec es. e, PO ₂ - Pr l usage, P	rithms. be able ts that roblem an O 6- The e	e to wo involve nalysis, Po	ork effec the ap O3- Design and societ	ctively in oplication n/developi ty, PO 7- Er	teams ar of Bio-i ment of solu	nd collab mage Co tions, PO 4 and sustair	orate o omputi - Condu nability,	on ng loct inves	stiga	ations o	of comple
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Text	Books:
1	Bioimage Data Analysis" by Kota Miura
2	Bioimage Informatics" edited by A. K. Singh and X. Zhuang
Refe	rence Books:
1	Medical Image Analysis" by Atam P. Dhawan and Jasjit S. Suri
2	Handbook of Biomedical Imaging: Methodologies and Clinical Research" edited by J. Michael Fitzpatrick and
	Milan Sonka

MTCS343	ode			·	Course '				1	ture		
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Course Object		/										
1. Understan	d the prin	ciples of	digital in	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.						
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CO ₃							ges of digit	al image	analysi	s,	PO ₄ ,	PO ₅
	including						•	1 1	1	1 20		
CO ₄						l skills to	interpret a	ind analyz	ze digit	al PC)4, PO	9, PO 10
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problems, PO ₅ -												
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Outcomes		PO ₂								PO ₁₀	PO ₁₁	PO ₁₂
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Outcomes CO1 CO2				PO ₄	PO ₅					PO ₁₀	PO ₁₁	PO ₁₂
Outcomes CO1 CO2 CO3		2	PO ₃	PO ₄					PO ₉		PO ₁₁	PO ₁₂
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2 Pattern Recognition and Machine Learning" by Christopher M. Bishop.

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	underpir												
CO ₂	edge and	l fog cor	design and deploy edge and fog computing solutions: By studying PO₂, PO₃ og computing, you can learn how to design and deploy edge and fog solutions that meet specific business needs.										PO ₃
CO ₃	Improve	d efficie ng are	ncy and designe	l perfor	mance o	f compu	ting syster iency and					PO ₄ ,	PO ₅
CO ₄ PO ₁ - Engineering problems, PO ₅ - 1	improve needs to vulnerab g Knowledg	the sector be tran- ility in a e, PO ₂ - P	urity and smitted comput roblem ar	l privacy over ne ing syste nalysis, P	v of data tworks a em. D3- Design	by reduce and reduce n/develop		nount of mber of tions, PO 4	data t points - Cond	hat of uct inv	estig	ations	
or team work, PC			PO ₁₁ - Pro	ject mana	agement a	nd finance		long Learn	ing	,		-,	
Course													
Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO_6	PO ₇	PO ₈	PO ₉	PC) ₁₀	PO ₁	1 PO 12
CO ₁	3	2											
CO ₂		2	2										
CO ₃				2	2								
CO ₄				2					2	3	3		
			1 -	Reason	able; 2 –	Significar	ıt; 3 – Stro	ng					
Detailed Conte 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		_						
 To provide ins To understand 									A A A A A A A A A A A A A A A A A A A	nd quani	ng mode			
 To understand To optimize the 														
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 ₁	Understa	and appr	opriate	optimiza	tion me	thod to s	olve con	nplex pro	blems		D ₁ , PO ₂ ,	· /		
	involved		-	-				· ·						
CO ₂	Analyze	the appr	opriate	algorithr	n for all	ocation o	f resourd	ces to op	timize	PO	D ₃ , PO ₄ ,	PO ₅		
	the vario	us progr	amming	techniq	ues.			-						
CO ₃						orkings o		phical, si	mplex	PO	D ₄ , PO ₆ ,	PO ₉		
						ve decisio	n on							
	variables													
CO_4						of various				PO ₄ , PO ₅ , PO ₆ , PO ₉				
						world pro				L .				
PO ₁ - Engineering Kr														
problems, PO ₅ - Mod										PO ₈ - Ethi	cs, PO ₉ -	Individua		
or team work, PO ₁₀ -	Communic	cation, PC				mes with								
Course Outcomes	S PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO 7	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂		
	3	2	103	2	103	100	10/	108	109	1 0 10	101	1 0 12		
		_	2	1	2									
CO ₃	-			2		2			2					
		<u>2</u>							_					
CO4				U U	-	2			2					
CO ₄			1 – R	easonabl	e: 2 – Sia	-	3 – Stroi	na	2					
	 ;:		1 – R	easonabl	e; 2 – Sig	 gnificant;	3 – Stroi	ng	2					
CO ₄ Detailed Contents	5:	Introdu				jnificant;		0	1	zation –	Stateme	ent of ar		
Detailed Contents	5:		uction to	o Optimi	zation: E	jnificant; 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		
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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 psack 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. cuttir 0-1 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	- j				
Course Outco		,											
COs No.			StatementMapped ProgramOutcomes (POs)										
CO ₁			rchitecture, infrastructure and delivery models of cloud computing PO1, PO2										
CO_2	°		ud, data center, hypervisor, CPU, and memory management PO₂, PO₃, PO₄, PO₅ ,										
70	concerns		PO ₇										
<u>CO3</u>			e virtualization concept. PO ₃ , PO ₅ loud computing, virtualization, security, and privacy issues. PO ₄ , PO ₅ , PO ₈										
CO ₄ PO ₁ - Engineerin													
problems, PO ₅ - or team work, P	Modern too	ol usage, F	0 6- The PO 11- Pro	engineer a oject mana	and socie igement a	ty, PO 7- Er and finance	vironment a , PO 12- Life-	and sustair long Learn	ability, ing				
		1	Mapp	oing of co	ourse ou	tcomes w	ith prograr	n outcom	es		1		
Course	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PC) ₁₁ F	PO12
Outcomes			103	101	103	100	10/	108	103	1 010			012
<u>CO1</u>	2	2											
		2	2 2	1	2		1						
CO ₃ CO ₄			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 Cloud 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														
 To gain an o regarding wir To introduce 	eless acce	ess to) Inte	ernet		0								•
multipoint, m3. To provide at WMAN, WWA4. To get and in	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 ₁	Underst	and h	asic	terms a	nd chara	octeristic	es of wire	less acce	ss netwo	rks			PO ₁ , PO	
								icss acce	SS IICtwo	1 K3.				
CO ₃		alyze various wireless access technologiesPO2, PO4, PO6alyze measurements of wireless access network parameter.PO3, PO4, PO5												
CO4	l l						s networ				PC		PO5, PO1	
PO ₁ - Engineering Ki									tions, PO 4	- Condu				
problems, PO ₅ - Moo or team work, PO ₁₀ -	dern tool u	sage,	PO ₆ -	- The eng m- Projec	ineer and t manage	l society, ment and	PO7- Envi	ronment a O 12- Life-l	ind sustair long Learn	nability, ing				
Course Outcomes	S PO ₁	PC		PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁	0	PO ₁₁	PO ₁₂
	2			100	101	2	100					.0	1011	1 0 12
CO ₂		2	2		2		2							
CO ₃				2	3	3								
CO ₄					2	2					2			2
				1 – R	easonabl	e; 2 – Sig	nificant;	3 - Stroi	ig					
Detailed 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, researc 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 oval: 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 ₁	•		assess the requirements and challenges of big data processing and identify appropriate algorithmic solutions.										
CO ₂			and apply distributed computing and parallel algorithms, such as to handle large-scale data processing and analysis.										
CO ₃	Apply da	ita mini	nining and machine learning techniques to analyze and extract PO ₄ , PO ₅										
			shts from large-scale datasets, and understand their strengths and										
CO ₄	limitation		privoou	and a	oourity	aballange	es in big	data an	d ann	ly D	<u>а</u> р	O ₉ , PO ₁₀	
04	appropri					chanenge	ts in big	uata, al	iu app	Iy F	J4, F	U 9, FU 10	
PO1- Engineering						/developr	nent of solu	tions, PO 4-	· Condu	ct investi	gation	s of complex	
problems, PO5- N	lodern too	l usage, P	O ₆ - The e	engineer a	and societ	y, PO 7- En	vironment a	nd sustain	ability,				
or team work, PO	10- Commu	nication,											
			Марр	ing of co	ourse out	comes wi	ith progran	n outcom	es	1	1		
Course Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	РС	P11 PO ₁₂	
CO ₁	3	2											
	0	2	2										
CO ₃				2	2								
CO ₄				2					2	3			
			1 -	Reasona	ıble; 2 – S	Significan	it; 3 – Stror	ıg			•		
Detailed 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 ing 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 og techn 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 Leat 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 ning Algo ing techn ners; Stro nt 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 oval: 16t	h BoS 17-			4)	
	Scheme						S	cheme o	f Exam	ination	l <u> </u>	
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	Credits	: 4								emeste		70
Instructio			cture]	Exam D	uration	n :	3 Hrs.
Prerequisite(s):		cture & A	Algorithr	ns								
Course Objectiv					4	1		1	~			
 To understand To acquire the To analysis the 	ne knowle	edge of d	lrawing a	lgorithr	ns and te	chniques						
4. To apply 3-E				0	0	15.						
Course Outcome	8	epiesen		neepts.								
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CO3 NO.				•	stateme	iit.						
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CO ₂		rate the	te the different 2D Geometric transformations and viewing PO ₃									
			e Structure and Modeling concepts PO ₃ , PO ₄									
CO ₄	Apply the	e 3D tran	nsformat	ions and	surface	detection	methods			İ	PO ₃ , P	O 9
PO1- Engineering											tigations	of complex
problems, PO ₅ - Mo										PO ₈ - Et	hics, PO 9 ⁻	- Individual
or team work, PO ₁₀	- Commu	nication, I										
Course			маррі	ng oi co	urse out	comes wi	th progran	outcom	es	r	1	
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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 Co	ode	Course Title								ecture	e				
MTCS455PET		Data Visualization L								Т	P Semester:				
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	ore	:	100		
	s/Week	: 4	: 4 Internal Evalua						valuat	ion	:	30			
	Credits	: 4	: 4 End Sem						Semes	ster	: 70				
Instructi	on Mode	: L	ecture						Exam	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 ₁	Understa	nd the principles and best practices of data visualization, and be able PO₁, PO₂											PO ₂		
	to apply (hem to real-world datasets.													
CO ₂	Select ap	propr	iate visual	izations	for diffe	erent type	es of data	and com	munic	ate		PO ₂ ,	PO ₃		
			using visu												
CO ₃		the skills to create effective and visually appealing visualizations using									PO4, PO5				
		of tools and techniques.													
CO ₄	Design visualizations for clarity and simplicity, considering the audience and PO4 , PO								9, PO 10						
			nsideratio												
PO ₁ - Engineering															
problems, PO 5- N or team work, PO										, PO ₈ -	Ethic	CS, PO 9 ⁻	- Individua		
		mcatio					ith program								
Course													_		
Outcomes	PO ₁	PO_2	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	P	D ₁₀	PO ₁₁	PO ₁₂		
CO1	3	2			ł	1		1							
		2	2		ł	1		1							
CO3		_		2	2	1		1							
CO ₄				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							alization; T						,		
													tools (e.g		
		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													
		share and graphs (e.g. bartangs the many distribution of the states). Advanced													

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 MTCS461PET										T P	Somestor II						
Version: 1.2						Unit ComputingLh BoS 17-11-20224				$\begin{array}{c c} 1 & P \\ \hline 0 & 0 \end{array}$	Semester: IV						
	Scheme o) of Instru		of Appre	oval. 10tl	1 005 17-1		Scheme	-	• •							
	Periods	т т	Hrs.							n Score		100					
	/ Week	: 4	1115.						•	30							
i crious	Credits	: 4				Internal Eva End Se				emester	•	70					
Instructio			: Lecture						Exam Duration : 3 Hi								
Prerequisite(s): Co										urution	•	0 1110.					
Course Objectives		Grupin															
1. To understand		f GPU ar	chitectu	re. issues	s in map	ping algor	rithms ar	d differe	nt GPU	program	ming M	odels.					
2. To introduce p																	
3. To acquaint er											PUs).						
4. To introduce t											,						
Course Outcomes		•	U														
COs No.	、 /			St	atemen	t				Мар	ped Pro	gram					
			Outcomes (POs)														
CO ₁	Analyze	alyze GPU architecture, assess their advantages and identify potential										PO ₂ , PO ₃ , PO ₁₂					
	software	ware optimizations based on knowledge of the GPU architecture															
CO ₂	Understa	and the	working	PO ₁ , PO ₂ , PO ₃ , PO ₄													
	GPU cod																
	-	ent efficient algorithms, parallel programming patterns to solve									PO ₂ , PO ₃ , PO ₄ , PO ₉						
		ld problems.															
CO ₄	-	hend the parallel programming techniques and implementation of									PO ₂ , PO ₃ , PO ₄ , PO ₁₂						
	program																
PO ₁ - Engineering Kn																	
problems, PO ₅ - Mod or team work, PO ₁₀ -										PO ₈ - Ethic	S, PO ₉ -	maiviaua					
01 team work, PO 10 ⁻	Communic					omes with											
Course Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO9	PO ₁₀	PO ₁₁	PO ₁₂					
CO ₁	101	2	1	104	105	100	10/	108	105	1 010	101	3					
	3	2	2	1								0					
CO ₃	0	3	1	2					1								
CO ₄		2	3	1								1					
		1	1 – R	easonabl	e: 2 – Sic	gnificant;	3 – Stroi	ra									
Detailed Contents	:					j j,		J									
		Introd	uction: H	listory,	Graphics	s Process	ors, Gra	phics Pro	ocessin	g Units,	GPGPU	s. Cloc					
							Introduction: History, Graphics Processors, Graphics Processing Units, GPGPUs. Clock speeds, CPU / GPU comparisons, Heterogeneity, Accelerators, Parallel programming.										
I I						CUDA Open CL / Open ACC, Hello World Computation Kernels, Launch parameters,											
Unit: 1		Thread hierarchy, Warps / Wave fronts, Thread blocks / Workgroups, Streaming															
		Thread	l hieraro	chy, Wa	rps / '		orld Co	mputatio	n Kern	els, Laun		ameters					
							orld Con onts, Thr	mputation read bloc	n Kern	els, Laun		ameters					
		multip proper	rocessor ties, Sim	s, 1D / 21 ple Prog	D / 3D t rams.	Wave fro hread ma	vorld Con onts, Thr pping, D	mputation read bloc evice	n Kerne cks /	els, Laun Workgro	ups, St	ameters					
		multip proper Memor	rocessor ties, Sim ry: Mem	s, 1D / 2 ple Prog ory hier	D / 3D t rams. archy, D	Wave fro hread ma	Vorld Con onts, Thr pping, Do global, Ic	mputation read bloc evice real / sh	n Kernecks /	els, Laun Workgro	ups, St	ameters					
Unit: 2		multip proper Memor Consta	rocessor ties, Sim ry: Mem int Memo	s, 1D / 21 ple Prog ory hier ory, Poin	D / 3D t rams. archy, E ters, Par	Wave fro hread ma DRAM / § cameter P.	Vorld Con onts, Thr pping, Do global, Ic assing, A	mputation read bloc evice real / sh rrays and	n Kerne eks / ared, p dynam	els, Laun Workgro rivate / ic	ups, St	ameters reamin extures					
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		multip proper Memor Consta Memor Progra Synchr fence. Linked	rocessor ties, Sim ry: Mem nt Memo ry, Multi <u>ms with</u> ronizatio Prefix su -lists. Sy	s, ID / 2 ple Prog ory hiera ory, Poin -dimensi <u>matrices</u> m: Memo m, Redu ynchroni	D / 3D t rams. archy, D ters, Par onal Arr , Perfor ory Cons ction. Pr zation a	Wave fro hread ma DRAM / g cameter P- rays, Men mance eva sistency, cograms fr across CF	Yorld Con Ints, Thr pping, Do global, Ic assing, A nory Allo aluation Barriers or concu PU and O	mputation read bloce evice rays and cation, M with diffe (local ve rrent Dat GPU Fun	ared, p dynam lemory rent me rsus gl a Struc ctions:	els, Laun Workgro rivate / ic copying emories. obal), At tures suc Device	ups, St local, t across omics, ch as W function	ameters reamin cextures devices Memor ork lists ns, Hos					
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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.

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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

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PO ₁ - Engineering 1 problems, PO ₅ - Me or team work, PO ₁₀	odern tool	usage, P	0 6- The e PO11- Pro	engineer a ject mana	nd societ gement a	ty, PO 7- En nd finance	vironment a	and sustain long Learn	ability, ing			
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	propagation and performance analysis. Create and Design wireless networks exploring trade-offs between wire line and wireless links.								PO3, PO4	, PO 10		
	nalyze a roblems		elop mo	oile appl	ications	to solve	some of	the real-	world	I	PO ₃ , PO	5, PO 12
or team work, PO ₁₀ - Co		I	Mappin	g of cour	se outco	mes with	progran	n outcom	es	DO	DO	
Course Outcomes CO ₁	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO	1 PO 1
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Detailed Contents:					, .			5				
Unit: 1	Introduction: Wireless Networking Trends, Key Wireless Physica Access Technologies -CDMA, FDMA, TDMA, Spread Spectrum reuse, Radio Propagation and Modelling, Challenges in Mob								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	issues.Unit: 2Wireless Cellular Networks: 1G and 2G, 2.5G, 3G, and 4G, Mob over Wireless Networks, Cellular architecture, Frequency re strategies, Handoff strategies, Interference and system capacity capacity in cellular systems, Spread spectrum Technologies.								cy reu pacity,	se, Ch	annel a	ssignme
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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.

Course					Course '					ture			
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Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Con Unit	PO ₁ 3	PO2 2 2 3 3 4 5 5 7 7 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 Reasona Introduc cent and coteins, ene and coteins, ene and to Prob , Proteor to Artifi hms, He ques, Co automata iques; P orks, Mar bor appro- cering 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 omplexity a, Classer tobabilis kov netv l Cluster oach for chniques od, Gain ions.	PO6 PO6 Significan Significan Che Basics deoxyribe knowled egulation d Challe ference to elligence earch mo of sear s of proble stic Approvers. ring App secondar , Applicat criterion	PO7 PO7 PO7 s of Molec onucleic ac lge and t , When enges in echnology, and Com ethods, Op ch, Use c ems. paches: Int ry structur ion guideli , Over fitt	n outcom PO ₈ ng ular Biole cid (DNA) he 'centr cell regu Bioinforr viruses, a puter Sc ptimal se of graphs roduction introducti re protein nes. ing and p	es PO ₉ 2 ogy: Bas , Histor ral dog ilation natics: and the ience: arch st in bic n to pro	3 sic cell y of th ma', V goes Introd rategie binform babilit arestn g pred	l arco ne h Why wr ducc ne s luct es, nati eigl licti icat	chitect tuman 7 prot ong, tion, tion, to Proble cs, Gr ayes' T hbour tion, Cl tion, gu	Genome o search ms with ammars Theorem methoo ustering uidelines
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Course Outcomes CO ₁ CO ₂ CO ₃ CO ₄ Detailed Con Unit	PO ₁ 3	PO2 2 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 Reasona Introduce tent and roteins, ene and roteins, roteins, roteins rotein	PO5 PO5 2 able; 2 – 3 tion to t scale of Current cell r lems ar ne, Inter cial Cluster cians. Genetic cial cians.	PO6 PO6 Significar Significar Significar Significar Significar Che Basica deoxyribo knowled egulation ad Challe ference to earch mo of sear s of proble stic Approving vorks. ring App secondar , Applicat criterion Algorithm	PO7 PO7 PO7 s of Molec onucleic ad lge and t , When enges in echnology, and Com ethods, Op ch, Use c ems. oaches: Int ry structur ion guideli , Over fitt ms: Metho	n outcom PO ₈ PO ₈ ng ular Biolo cid (DNA) he 'centricell' regu Bioinforr viruses, a puter Sc poter Sc poter Sc poter Sc orimal se of graphs roduction introducti re protein nes. ing and p od, Applic gorithms	es PO ₉ 2 ogy: Bas , Histor al dog ilation matics: and the ience: arch st in bic on, Ne a foldin oruning ation g -metho	3 sic cell y of th ma', V goes Introd immun Introd rategie inform bability arestn g pred , Appli uidelin	l arcone h Why wr duct es, nation y, B licti icat nes, 1 ez	chitect uman 7 prot rong, tion, ystem ion to Proble cs, Gr bayes' T hbour ion, Cl ion gu ion gu	Cure, Th genome eins ar what i Genome o search ms witt ammars Theoren methoo ustering idelines ormatic

	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.
	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 Beginnersl Academic Press, First Edition, 2014.

Course Co					Course 7				Lee	ture		
MTAC211F	PET									Т Р	Sem	ester: II
Version: 1.2				e of Appi	:oval: 16t	h BoS 17-	11-2022		2	0 0		
	Scheme	of Instr	uction				S	Scheme o	f Exam	ination		
No. o	f Periods	: 30 Hrs. Maximum S							n Score	:	50	
Period	s/Week	: 2						Inte	rnal Eva	aluation	:	15
	Credits	: -				End Semester :						35
Instructi		: Le	cture			-				uration		2 Hrs.
Prerequisite(s):				h					<u></u>	aration		
Course Objectiv		meage	or Englis									
. Understand		to impr	ove vour	writing	skills and	l level of i	readahility					
2. Learn about		-		0	SKIIIS ark		cadability	•				
3. Understand					itlo Encu	iro tho do	od quality	ofpapor	at vorv	first_tim	o cubm	ingion
				0		0	ou quality	or paper a	at very	in st-tim	e subili	1551011.
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											ıtcome	· /
CO ₁						rch Paper				PO		O ₆ , PO ₁₀
CO ₂			,			dancy in	0				PO ₃ , 1	
CO ₃	Summari	ze, evalı	late liter	ature, ar	d write	methodol	ogy, result	s and cor	nclusior	PO	2, PO ₃ , I	PO ₄ , PO ₅
CO ₄	Apply con	rrect sty	le of refe	erencing	and use	punctuat	ion				PO ₁₀ , 1	
	appropria			U							-	
PO1- Engineering	Knowledge	e, PO 2- P1	oblem an	alysis, PO	3- Design	/developr	nent of solu	tions, PO4	- Condu	ct investig	gations o	of comple
problems, PO 5- N										PO8- Ethi	cs, PO 9-	Individu
or team work, PO	10- Commu	nication,										
			Марр	ing of co	urse out	comes wi	th program	n outcom	es			
Course	DO	DO.	DO.	DO	DO.	DO.	DO	DO.	DO.	DO	DO	DO
Outcomes	PO ₁	PO_2	PO ₃	PO ₄	PO ₅	PO_6	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO ₁	3	2				2				2		
CO ₂			2	2								
CO ₃		1	2	1	2							
CO ₄										2		1
			1-	Reasona	hle [.] 2 - 8	Sianifican	it; 3 – Stroi	na		-		-
Detailed Conte	nts'		-	Reasona		rightjioun		ig				
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Unit: 3							s, Discussi					
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Unit: 4				eeded w	hen writ	ing an In	troduction	i, skills ne	eeded v	when wri	ting a F	leview c
			erature.			.1						1. 1.11
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Unit: 5							n, skills are					
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		submis										
Examination a												
exams/ assignn	nents/ qu	iz/ semi	inar pres	entation	etc. and	external	evaluation	(35 mark	s) whic	h is mair	nly end	semeste
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examination.												
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Text Books:	R (2006) V	Vriting f	or Scien	ce, Yale V	Jniversit	y Press (a	available or	n Google I	BOOKS)			
Text Books:1Glodbort												
2 Day R (20	06) How t						nvailable or nbridge Un					
Text Books:1Glodbort2Day R (20Reference Book	06) How t (s:	o Write	and Pub	lish a Sci	entific P	aper, Can	nbridge Un	iversity P	ress.	book		
Text Books:1Glodbort2Day R (20)Reference Book1Highman	06) How t s: N (1998), I	o Write Handboo	and Publock of Wri	lish a Sci ting for 1	entific P	aper, Can ematical		iversity P SIAM. Hig	Press. Thman's			

Course Co	Course Code Course Title									ture		
MTAC212P	ΈT			Va	lue Edu	cation			L	T P	Sen	nester: II
Version: 1.2				e of Appi	roval: 16t	h BoS 17-1			2	0 0		
	Scheme						S	cheme o				
	Periods		Hrs.							n Score	:	50
Period	s/Week	: 2				Internal Evaluation : 15 End Semester : 35						
The set set of t	Credits	: -	4								:	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. Statement									Map	ped Pi	ogram	
									comes	· /		
CO ₁	Knowled	ge of sel	f-develo	pment.						-		O ₈ , PO ₉ ,
											PO ₁₀ , P	
CO_2	Learn the	e import	ance of I	Human \	/alues.						,	O ₈ , PO ₉ ,
60	Dl		11		_						PO_{10}, P	
CO ₃	Developi	ng the o	verall pe	rsonality	/.							O ₇ , PO ₈ ,
CO ₄	Coin dee	per unde	arstandir	ar about	the nur	oose of th	om lifo				9, PO ₁₀	, PO12 O7, PO8,
004	Gain ucc	per unu	li stanun	ig about	. uie pui		em me.				9, PO 10	
PO1- Engineering	Knowledge	, PO 2- Pr	oblem ana	alysis, PO	3- Design	/developm	nent of solut	ions, PO4-	- Condu			
problems, PO5- M	odern tool	usage, PC	D ₆ - The e	ngineer a	nd societ	y, PO 7- Env	vironment a	nd sustair	nability,			
or team work, PO10	o- Commur	nication, H										
			Mappi	ng of co	urse out	comes wit	th program	outcom	es	1		
Course	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
Outcomes CO ₁						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
		I	_	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		-		J .	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	• .•	m 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					

	Course CodeCoMTAC213PETPedag									ture		
	ET				agogy S				L	T P	Seme	ster: II
Version: 1.2				of Appro	oval: 16th	n BoS 17-1			2	0 0		
	Scheme of							Scheme				
	Periods		Hrs.							n Score	:	50
Periods	/ Week	: 2						Inte		luation	:	15
֥	Credits	: -								emester	:	35
Instructio			ture						Exam D	uration	:	2 Hrs.
Prerequisite(s): No		c prere	quisite									
Course Objectives		-f d					او ما خانه او ما					
 To understand To demonstra motivation and To Illustrate th 	l the basi ate conce d learning ne critica	c view of epts rela g.	different ated to	it pedago commur	ogical ori nication	ientations theory -	describ	e and re				
Course Outcomes	(CO):			-								
COs No. Statement									ped Pro			
CO . Understand the nodegogical practices used by teachers in formal							1		comes (,		
	CO ₁ Understand the pedagogical practices used by teachers in formal ar informal classrooms in developing countries										D ₁ , PO ₂ , I	
	CO ₂ Analyze the evidence on the effectiveness of these pedagogical practices in									PC	D ₃ , PO ₄ , I	PO_6
what conditions, and with what												
	population of learners?CO3Analyze teacher education (curriculum and practicum) and									D		0.
CO ₃						a practict naterials		oport off	octivo	PC	D ₇ , PO ₈ , I	O 9
	pedagog		iculum	and gui	uance n	liaterials	best su	pport en	ective			
CO ₄	Evaluate		tforma	of Supor	vision					DO.	PO ₈ , PO ₈	DO.a
PO ₁ - Engineering Kn						lovolopmo	nt of solut	tions DO	Condu			
or team work, PO ₁₀ -	PO ₁	PO ₂				omes with PO ₆				PO ₁₀	PO ₁₁	PO ₁₂
CO ₁	2	1	2									
CO_2			1	2		2						
CO ₃							2	2	2			
CO ₄		2						2	2			2
			1 – R	easonabl	e; 2 – Sig	jnificant;	3 – Stror	ıg				
Detailed Contents	:											
Unit: 1		framev	vork an	d termin	ology	Aims ar Theories ch questi	of lear	rning, Cu	rricului	n, Teac	her ed	ucation.
Unit: 2		Thema	tic over	view: Pe	dagogic	al practio	es are	being us	ed by	teachers	in form	0
	informal classrooms in developing countries. Curriculum, Tea								Cuciici	Juncari		n donth
Unit: 3 Evidence on the effectiveness stage: quality assessment of inc practicum) and the school cu pedagogy? Theory of change.										lology fo	л ис і	n-aebun
Unit: 3		Eviden stage: o practic pedago	quality a cum) and ogy? The	ssessmen 1 the sc ory of c	nt of incl hool cu hange. S	of pedag luded stu- rriculum Strength a	gogical p dies. Hov and gui and natu	ractices v can tea dance m re of the	Methoo cher eo aterials body o	lucation best su of evider	(curricu apport ence for e	lum and effective effective
Unit: 3		Eviden stage: o practic pedago pedago and be	quality a cum) and ogy? The ogical pra liefs and	ssessmer l the sc ory of c actices. l Pedagog	nt of incl hool cu hange. S Pedagogi gic strate	of pedag luded stu- rriculum Strength a ic theory egies.	gogical p dies. Hov and gui and natu and ped	v can tea dance m re of the agogical	Methoo cher ec aterials body o approa	lucation best su of eviden ches. Tea	(curricu apport ence for ence achers' a	lum and effective effective ttitudes
Unit: 3 Unit: 4		Eviden stage: o practic pedago pedago and be Profess Peer Su	quality a sum) and ogy? The ogical pra liefs and sional de upport fr	ssessmen l the sc ory of c actices. I <u>Pedagog</u> evelopme om the l	nt of incl hool cu hange. S Pedagogi tic strate ent: align nead teac	of pedag luded stur rriculum Strength a ic theory	gogical p dies. How and gui and natu and ped ith class the comr	ractices w can tea dance m re of the agogical room pra nunity.	Method cher ec aterials body o approad	lucation best su of evider ches. Tea and foll	(curricul apport e ace for e achers' a ow-up s	lum and effective effective ttitudes
Unit: 4 Unit: 5		Eviden stage: o practic pedago and be Profess Peer So Currico Resear educat	quality a cum) and ogy? The ogical pra- liefs and sional de apport fr alum and ch gaps a ion. Curr	ssessmen I the sc ory of c actices. I Pedagog evelopme om the I assessm and futur riculum a	nt of incl hool cu hange. S Pedagogi tic strate ent: align nead teac nent Barr re direct and asses	of pedag luded stu- rriculum Strength a ic theory egies. nment w cher and t riers to le ions ^{DD} Res ssment ^{DD}	gogical p dies. How and gui and natu and ped ith class the comr arning: li gearch Dissemir	ractices w can tea dance m re of the agogical room pra nunity. mited res design. nation and	Methoo cher ed aterials body o approad actices sources Contex I resear	lucation best su of eviden ches. Tea and foll- and larg ts Peda ch impac	(curricul apport e ace for e achers' a ow-up s e class s agogy.	lum and effective effective ttitudes support izes. Teacher
Unit: 4 Unit: 5 Examination and		Eviden stage: (practic pedago and be Profess Peer St Curricu Resear educat	quality a cum) and ogy? The ogical pra- liefs and sional de apport fr alum and ch gaps a ion. Curr ern: It ir	ssessmen I the sc ory of c actices. I Pedagog evelopme from the P assessm and futur riculum a aclude bo	nt of incl hool cu hange. S Pedagogi cic strate ent: align nead teac nent Barr re direct and assess oth inter	of pedag luded stur rriculum Strength a ic theory egies. nment w cher and t riers to le ions ^{III} Res ssment ^{III}	gogical p dies. How and gui and natu and ped ith class the comr arning: li search Dissemir lation (15	ractices w can tea dance m re of the agogical room pra nunity. <u>mited res</u> design. <u>nation and</u> 5 marks)	Methoo cher ed aterials body o approad actices sources Contex 1 resear compri	lucation best su of eviden ches. Tea and foll and larg ts Peda cch impac sing two	(curricul apport e ace for e achers' a ow-up s e class s agogy. ct. o class s	lum and effective effective ttitudes support izes. Teacher essional
Unit: 4 Unit: 5 Examination and exams/ assignmen		Eviden stage: (practic pedago and be Profess Peer Si Curricu Resear educat	quality a cum) and ogy? The ogical pra- liefs and sional de apport fr alum and ch gaps a ion. Curr ern: It ir	ssessmen I the sc ory of c actices. I Pedagog evelopme from the P assessm and futur riculum a aclude bo	nt of incl hool cu hange. S Pedagogi cic strate ent: align nead teac nent Barr re direct and assess oth inter	of pedag luded stur rriculum Strength a ic theory egies. nment w cher and t riers to le ions ^{III} Res ssment ^{III}	gogical p dies. How and gui and natu and ped ith class the comr arning: li search Dissemir lation (15	ractices w can tea dance m re of the agogical room pra nunity. <u>mited res</u> design. <u>nation and</u> 5 marks)	Methoo cher ed aterials body o approad actices sources Contex 1 resear compri	lucation best su of eviden ches. Tea and foll and larg ts Peda cch impac sing two	(curricul apport e ace for e achers' a ow-up s e class s agogy. ct. o class s	lum and effective effective ttitudes support izes. Teacher essional
Unit: 4 Unit: 5 Examination and exams/ assignmer examination.		Eviden stage: (practic pedago and be Profess Peer Si Curricu Resear educat	quality a cum) and ogy? The ogical pra- liefs and sional de apport fr alum and ch gaps a ion. Curr ern: It ir	ssessmen I the sc ory of c actices. I Pedagog evelopme from the P assessm and futur riculum a aclude bo	nt of incl hool cu hange. S Pedagogi cic strate ent: align nead teac nent Barr re direct and assess oth inter	of pedag luded stur rriculum Strength a ic theory egies. nment w cher and t riers to le ions ^{III} Res ssment ^{III}	gogical p dies. How and gui and natu and ped ith class the comr arning: li search Dissemir lation (15	ractices w can tea dance m re of the agogical room pra nunity. <u>mited res</u> design. <u>nation and</u> 5 marks)	Methoo cher ed aterials body o approad actices sources Contex 1 resear compri	lucation best su of eviden ches. Tea and foll and larg ts Peda cch impac sing two	(curricul apport e ace for e achers' a ow-up s e class s agogy. ct. o class s	lum and effective effective ttitudes support izes. Teacher essiona
Unit: 4 Unit: 5 Examination and exams/ assignmer examination. Text Books:	nts/ quiz	Eviden stage: c practic pedago and be Profess Peer Su Curricu Resear educat on Patte	quality a cum) and ogy? The ogical pra- liefs and sional de upport fr ulum and ch gaps a ion. Curr ern: It ir ar preser	ssessmen I the sc ory of c actices. I Pedagog evelopme from the I assessm and futur riculum a iclude be natation et	nt of incl hool cu hange. S Pedagogi gic strate ent: align nead teach nent Barn re direct and assess oth inter tc. and e	of pedag luded stu rriculum Strength a ic theory egies. nment w cher and t riers to le ions ^{III} Res ssment ^{III} rnal evalu xternal evalu	gogical p dies. How and gui and natu and ped ith class the comr arning: li search Dissemir uation (15 valuation	ractices w can tea dance m re of the agogical room pra nunity. mited res design. nation and 5 marks) (35 mark	Methoo cher ec aterials body o approad actices sources Contex l resear compri cs) whic	lucation best su of eviden ches. Tea and foll and larg ts Peda rch impac sing two h is main	(curricul apport e ace for e achers' a ow-up s e class s agogy. ct. o class s aly end s	lum and effective effective ttitudes support izes. Teacher essiona
Unit: 4 Unit: 5 Examination and exams/ assignmer examination.	nts/ quiz	Eviden stage: (practic pedago and be Profess Peer Su Curricu Resear educat on Patte / semina	quality a cum) and ogy? The ogical pra- liefs and sional de apport fr alum and ch gaps a ion. Cum ern: It ir ar preser	ssessmen I the sc ory of c actices. I Pedagog evelopme om the I I assessm and futur riculum a include bo ntation en interact	nt of incl hool cu hange. S Pedagogi sic strate ent: align nead teach nent Barn re direct and assess oth inter tc. and e	of pedag luded stur rriculum Strength a ic theory egies. nment w cher and t riers to le ions ^{DD} Res ssment ^{DD} rnal evalu xternal evalu	gogical p dies. How and gui and natu and ped ith class the comr arning: li carch o Dissemir ation (15 valuation	ractices w can tea dance m re of the agogical room pra nunity. <u>mited res</u> design. <u>action and</u> 5 marks) (35 mark	Methoo cher ed aterials body o approad actices sources Contex l reseat compri s) whic	lucation best su of eviden ches. Tea and foll and larg ts Peda rch impac sing two h is main	(curricul apport e ace for e achers' a ow-up s e class s agogy. ct. o class s aly end s	lum and effective effective ttitudes support izes. Teacher essiona emester

	(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 ₁	Understand the healthy mind in a healthy body thus improving social										PO ₆ , PO ₇ , PO ₈								
CO ₂	health. Understand the Improved efficiency with different asans.										PO ₆ , PO ₇ , PO ₈ , PO12								
CO ₂	Understa									r		07, PO7,							
CO ₃	Apply and					g with asa	115.			Т			, PO ₈ , PO ₁₂						
problems, PO 5- Moc or team work, PO 10-			0 11- Projec	, t manage	ment and		O 12- Life-l	long Learr	ning	, 108		5, 105							
Course Outcomes	S PO ₁	PO ₂	PO ₃	PO ₄	PO 5	PO ₆	PO 7	PO ₈	PO ₉	PC	20	PO ₁₁	PO ₁₂						
CO ₁		102	103	104	105	3	2	2	109		/10	IOI	1012						
CO ₂						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 Examination and exams/ assignment		Shauc Asan a Regula on Patt	ha, santos nd Prana arization o ern: 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 ern: 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 (ern: 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 (ern: 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 on Patt / 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												, .			
2. Develop a b											aajec	tives.			
 Understand Communic 											ong	and hadi			
 Communic conversation 		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 ₁	Ability to	read an	d write I	Irdu ser	int and h	asic texts	in Urdu				PO ₁₀				
					-			or and a	vntov i	n					
			understand and use basic Urdu vocabulary, grammar, and syntax in PO ¹⁰												
CO ₃			ntences and conversations. PO ₁₀ , PO ₁₂ PO ₁₀ , PO ₁₂												
003	•											,1 012			
CO ₄			ordering food, and asking for directions. Inding of the cultural context and social norms of Urdu-speaking PO ₁₀ , PO ₁₂									PO ₁₂			
004	commun	0	i the c		ontext	and socie		Ji Oldu i	speakin	5	2 0 10	,2 012			
PO1- Engineering			oblem ar	alvsis. PC) ₃ - Design	/developn	nent of solu	tions. PO 4-	Condu	ct investig	ations	of comple			
problems, PO ₅ - N															
or team work, PO															
		-	Марр	ing of co	ourse out	comes wi	th progran	n outcom	es						
Course	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO	11 PO 12			
Outcomes			- 00			100	- 07	100	- 00		- 0.				
CO ₁										2					
CO_2										2					
CO ₃										2		2			
CO ₄										2		2			
			1 -	Reason	ıble; 2 – 9	Significan	t; 3 – Stroi	ıq							
Detailed Conte	nts:							0							
								U		/					
		معدانا	1 2 1/ac	برانار کر الفال	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 ^ت 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 _ه ، 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 _ه ، حروا		نلے۔	لفظی ج	نظی جملے،چار			
		الفاظ، دو	، ،چار حر فی ا				رچزیں۔	چشمی هه ^م ر و 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 ^م ر و 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، ^ب 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، ^ب زار،ڈاک گھر			
Unit: 2 Unit: 3		لفاظ،دو	، ،چار حر فی 			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، ^ب 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، ^ب 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 پاکاترانہ۔	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 tern: 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/ assignr	nd Evalua	tion Pat	t tern: 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 tern: 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:	nd Evalua nents/ qu	tion Pat	t tern: 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	nd Evalua nents/ qu ıry Urdu" l	ition Pat iiz/ semi	t tern: 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	ition Pat iiz/ semi	t tern: 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 xs:	tion Pat iz/ semi by Azra F	t tern: It nar pres Chanam 1 Akbar 4	ارے include sentatior <u>Ali Shah</u>	کے جملے،اعد both in n etc. and	موقعوں ۔ الامثال۔ ternal eva external	رچيزيں۔ چندالفاظ،خا ^{حر} 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 xs:	tion Pat iz/ semi by Azra F by Syec se of Uro	t tern: 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 ^ص 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			