Learning Outcomes based Curriculum Framework (LOCF)

For

M. Tech.(Computer Science & Engineering) 2.5 Year Regular Part Time Postgraduate Programme 2021



Department of Computer Science & Engineering Chaudhary Devi Lal University





Sirsa-125055

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1. About the Department

There are two major streams in computer education. One of them is the Engineering stream leading to the B.E./B.Tech. degree and the other an Applications stream leading to the MCA degree. The primary emphasis in the MCA programme is on designing information systems for various organizations such as government departments, banks, insurance companies, hotels, hospitals, etc. Development of application software in diverse areas where computers are used will be the main function of MCA graduates. The major thrust in the MCA programme is on giving the graduates a sound background in computing, business functioning, and mathematics relevant to information technology systems. The curriculum has the courses relevant to achieving the programme outcomes. A strong laboratory component is a part of the MCA curriculum, for computer application students learn best by doing. The laboratories, besides supplementing the theory course should also expose the student to the use of the latest software tools. Every MCA student is required to spend 6-8 weeks summer training in a relevant software development house or related industry after taking their second-semester terminal examinations. Further, in their fourth semester, every MCA student shall have to work on a real-life software development project worth 8 credits. For carrying out the project work, MCA students shall be taught and trained in various software development platforms for desktop, web-based, and mobile-based applications.

Further, every MCA student shall have to earn 116 credits in total – 76 Core Courses credits, 28 discipline elective courses Credits, and 12 Open Elective Courses Credits offered by other teaching departments of the University. The students with non-computer background at graduation level are required to earn 12 credits through two Bridge Courses. Moreover, so as to enhance the life skills, the student may opt for up to two Add-On Courses- 2 credits each. The postgraduate programme in engineering stream of computer science leading to the M. Tech. CSE degree has its primary emphasis on designing systems in computer hardware and systems software. Designing embedded systems, designing peripherals and interfacing them to a computer and use of computers in signal processing are some other areas of interest to engineering students.

In computing science and engineering, students are provided a practical exposure to tools and technologies required in professional and academic arena. Curriculum of M. Tech. CSE programme comprises of an ample laboratory component, wherein the students get to know of current processes and technologies of this field. The M. Tech. CSE programme regular (Full Time and Part Time) are dedicated to conducting and reporting on a research problem culminating in a dissertation worth 14 credits. Further, every M. Tech. CSE Regular Full Time student shall have to earn 88 credits in total – 44 Core Courses credits, 36 Discipline Specific Elective Courses Credits and 8 Open Elective Courses Credits offered by other teaching departments of the University. Every M. Tech. CSE Regular Part Time student shall have to earn 70 credits in total – 40 Core Courses credits, 30 Discipline Specific Elective Courses Credits in total – 40 Core Courses credits, 30 Discipline Specific Elective Courses Credits in total – 40 Core Courses credits, 30 Discipline Specific Elective Courses Credits in total – 40 Core Courses credits, 30 Discipline Specific Elective Courses Credits in total – 40 Core Courses credits, 30 Discipline Specific Elective Courses Credits in total – 40 Core Courses credits, 30 Discipline Specific Elective Courses Credits. Mid-term examination shall cover the first two units of the course content. The question paper will be set by the internal teacher. This helps them blend their skills and orientation towards life in general and profession in particular. All in all, M. Tech. CSE graduates shall possess sound theoretical and research background apart from knowing modern principles and practices in computer science and engineering.

2. Learning Outcome based Curriculum Framework

The CBCS evolved into learning outcome based curriculum framework and provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill-based courses. The courses can be evaluated following the grading system,





which is considered to be better than the conventional marks system. Grading system provides uniformity in the evaluation and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations which enables the student to move across institutions of higher learning. The uniformity in evaluation system also enables the potential employers in assessing the performance of the candidates.

2.1 Objectives of the programme

After spending four to five years in their profession M.Tech. CSE Regular Part-Time graduates are expected to:

- apply knowledge and expertise gained thus far in problem-solving skills development and maintenance of software systems, tools, applications; academia and research in local and crossborder settings;
- be well adept in management of software development projects bearing techno-economical and social-behavioural delimitations; management of educational and research establishment; management of own start-up enterprise.
- exhibit support for peers and leadership by spearheading the projects teams; entrepreneurial skills by conceptualising new software projects; contributing to research and academia by way of undertaking research and academic assignments.
- engage in lifelong learning, career enhancement and adept to changing professional, societal, and environmental needs in a way conforming to his/her position in the profession/vocation;
- develop communication skills necessary to function productively in the given settings to achieve a successful professional/vocational career with academic and professional ethics and social obligations.

2.2 Programme Outcomes (POs)

Engineering Knowledge: Apply the knowledge of mathematics, science, engineering
fundamentals, and an engineering specialization to the solution of complex engineering
problems.
Problem Analysis: Identify formulate review research literature and analyze
Trobeni Anarysis. Renary, formatate, feview fescaren interatate, and anaryze
complex engineering problems reaching substantiated conclusions using first
principles of mathematics, natural sciences, and engineering sciences.
Dering /Derelement of Coletions Dering selections for seven large seven
Design/Development of Solutions: Design solutions for complex engineering
problems and design system components or processes that meet the specified needs
with appropriate consideration for the public health and safety, and the cultural,
societal, and environmental considerations.
Conduct Investigations of Complex Problems: Use research-based knowledge and
research methods including design of experiments, analysis and interpretation of data,





	and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and
	modern engineering and IT tools including prediction and modeling to complex
	engineering activities with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by the contextual knowledge
	to assess societal, health, safety, legal and cultural issues and the consequent
	responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of the professional
	engineering solutions in societal and environmental contexts, and demonstrate the
	knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities
	and norms of the engineering practice.
PO9	Individual and Team Work: Function effectively as an individual, and as a member
	or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the
	engineering community and with society at large, such as, being able to comprehend
	and write effective reports and design documentation, make effective presentations,
	and give and receive clear instructions.
PO11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2.3 **Programme Specific Outcomes (PSOs)**

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The graduates of the M.Tech. CSE Regular Part-Time programme will have/be:

PSO1	ample knowledge of principles and practices of computer science and engineering and capability of putting these principles to use in solving relevant problems.
PSO2	working knowledge of using modern computing tools and technologies like simulation & modelling and CASE tools in development and operations of various flavours of computer applications and in conduct of computing research.

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PSO3	well acquainted in adoption and application of skills gained during research and practice and exhibit a taste for adopting trending software processes to solve computing problems.
PSO4	working knowledge set for practicing their respective vocation/profession with ethics, integrity, leadership, and social responsibility.
PSO5	equipped to achieve their career goals in the academia/industry or pursue higher studies and enhance their professional knowledge.

3. Programme Structure

2.5 year M.TECH. C.S.E. Regular Part-Time programme is divided into five-semesters. The student is required to complete 40 Core Course credits, 30 Discipline Specific Elective Courses Credits (Core Courses, Discipline Specific Elective Courses, Skill Enhancement Courses and Open Elective Courses) for the completion of programme and award of degree.



Semester	Core Courses (CC)		Disciplin Elective (D	ne Specific e Courses OSC)	Skill Enhar Cour	ncement ses	Grand Total Credits
	No. of Courses	Total Credits	No. of Courses	Total Credits	No. of Courses	Total Credits	
Ι	3	10	01	04	-	-	-
II	3	10	01	04	-	-	
III	3	10	01	04	-	-	
IV	3	10	01	04	-	-	
V	-	-	-	-	1 (Dissertation)	20	
Total	-	40	-	16	-	20	76
%age	-	52.63%	-	21.05%	-	26.31%	

Table 1: MTech Regular Part-Time Credit Scheme

Note: Please mention L+P+T if practical is a part above.

Table 2: Detaile	l break-up o	of Credit C	Courses (Sei	mester wise)
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Semester	Core	Discipline Specific	Skill	Open Elective	Total
	Courses	Elective Courses	Enhancement	Courses	Courses
			Courses		
Ι	CC1	DSC1			4
	CC2				
	CC3				
II	CC4	DSC2			4
	CC5				
	CC6				
III	CC7	DSC3			
	CC8				4
	CC9				
IV	CC10	DSC4			4
	CC11				
	CC12				
V			SEC1		1
			Dissertation		

 Table 3: Course code and Title along with credits details

Course Code	Course Title	Credit		
	Semester I	Theory	Practical	Total
MTech/CSE/PT /1/CC1	Advanced Database Systems	4	0	4



MTech/CSE/PT /1/CC2	Advanced Data Structures	4	0	4
MTech/CSE/PT /1/DSC1	(a) Network Security,	4	0	4
	(b) Advanced Computer Networks,			
	(c) Wireless Networks			
MTech/CSE/PT /1/CC3	Software Lab based on MTech/CSE/PT	0	2	2
	/1/CC1 (implementation in PL/SQL)			
	Semester II			
MTech/CSE/PT /2/CC4	Advanced Web Technology	4	0	4
MTech/CSE/PT /2/CC5	Advanced Computer Architecture	4	0	4
MTech/CSE/PT /2/DSC2	(a) Soft Computing,	4	0	4
	(b) Machine Learning,			
	(c) Artificial Intelligence			
MTech/CSE/PT /2/CC6	Software Lab based on MTech/CSE/PT	0	2	2
	/2/CC4 (Advanced Web Technology)			
	Semester III			
MTech/CSE/PT /3/CC7	MATLAB Programming	4	0	4
MTech/CSE/PT /3/CC8	Advanced Operating Systems	4	0	4
MTech/CSE/PT /3/DSC3	(a) IoT and Cloud Computing,	4	0	4
	(b) Grid Computing,			
	(c) Quantum Computing			
MTech/CSE/PT /3/CC9	Software Lab based on M.Tech/CSE/PT	0	2	2
	/3/CC7 (MATLAB Programming)			
	Semester IV			
MTech/CSE/PT /4/CC10	Python Programming	4	0	4
MTech/CSE/PT /4/CC11	Research Methodology	4	0	4
MTech/CSE/PT /4/DSC4	(a) Data Warehousing and Data Mining,	4	0	4
	(b) Big Data Analytics,			
	(c) Data Science			
MTech/CSE/PT /4/CC12	Software Lab based on M.Tech/CSE/PT	0	2	2
	/4/CC10			
	(Python Programming)			
	Semester V			
MTech/CSE/PT /5/SEC1	Dissertation	0	20	20

Table 4: MTech CSE Regular Part Time Courses' List

Course Code	Course Code Course Title				
	Core Courses				
MTech/CSE/PT /1/CC1	Advanced Database Systems	4			
MTech/CSE/PT /1/CC2	Advanced Data Structures	4			
MTech/CSE/PT /1/CC3	Software Lab based on M.Tech/CSE/PT /1/CC1	2			
	(implementation in PL/SQL)				
MTech/CSE/PT /2/CC4	Advanced Web Technology	4			
MTech/CSE/PT /2/CC5	Advanced Computer Architecture	4			
MTech/CSE/PT /2/CC6	Software Lab based on MTech/CSE/PT /2/CC4	2			



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	(Advanced Web Technology)	
MTech/CSE/PT /3/CC7	MATLAB Programming	4
MTech/CSE/PT /3/CC8	Advanced Operating Systems	4
MTech/CSE/PT /3/CC9	Software Lab based on MTech/CSE/PT /3/CC7 (MATLAB	2
	Programming)	
MTech/CSE/PT	Python Programming	4
/4/CC10		
MTech/CSE/PT	Research Methodology	4
/4/CC11		
MTech/CSE/PT	Software Lab based on MTech/CSE/PT /4/CC10 (Python	2
/4/CC12	Programming)	
	Discipline Specific Elective Courses	
MTech/CSE/PT	(a) Network Security,	4
/1/DSC1	(b) Advanced Computer Networks,	
	(c) Wireless Networks	
MTech/CSE/PT	(a) Soft Computing,	4
/2/DSC2	(b) Machine Learning,	
	(c) Artificial Intelligence	
MTech/CSE/PT	(a) IoT and Cloud Computing,	4
/3/DSC3	(b) Grid Computing,	
	(c) Quantum Computing	
MTech/CSE/PT	(a) Data Warehousing and Data Mining,	4
/4/DSC4	(b) Big Data Analytics,	
	(c) Data Science	
	Skill Enhancement Courses	
MTech/CSE/PT	Dissertation	20
/5/SEC1		

Note: During the dissertation work Students be encouraged to publish their research work in Scopus/Web of Science(SCI, SCIE, ESCI)/UGC CARE journals.





MTech/CSE/PT/1/CC1: Advanced Database Systems							
Course Type	Course	Contact	Delivery	Maximum Marks		Exam	Assessment
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods
Compulsory Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/ Attendance

Course Objectives: The objective of this course is to get the students familiar with different concepts related to database.

Course Outcome	s At t	ne e	end of tl	his cours	e, the stu	dent wil	l be able	e to:					
C01	defi	lefine:3-schema architecture, ER diagrams, EER model, functional dependencies, normal											
	form	orms, data types, views in SQL, concurrency control techniques, database security issues,											
	sem	emantic data models, and client server architecture.											
CO2	disc	iscuss: ER diagram, relational model, EER model, functional dependencies, normal											
	forn	s,	SQL co	onstraints	s and vie	ws, reco	very tec	hnique	es, data	wareh	iouse, a	nd distr	ibuted
	data	oas	es.		r		1.0				1		1 .
CO3	appl	y:	inherita	nce, SQ	L statem	ents, no	rmal for	ms, SC	2L cor	istraint	s, deper	idencies	s, data
	secu	ity	, concu	rrency co	ontrol an	d recove	ry techn	iques c	n data	base.	1	C	100
CO4	cate	gor	ized: si	ubclass,	super c	lass, inf	eritance	, SQL	stater	nents,	normal	forms,	SQL
	cons		ints, dej	pendenci	es, data s	security,		ency co	ontrol a	ind reco	overy le	chnique La anat	es.
005	justi	ty:	subcias	ss, super	class, 11		re, SQL	querie	s, norr	nal lor	ms, SQ	L const	raints,
<u> </u>	dosi	unctional dependencies, security, concurrency control and recovery techniques.											
CO-PEO Mapping Matrix for Course MTech/CSE/PT/1/CC1													
COs	PE	01		PE	EO2		PEO3		PE	EO4		PEO	5
CO1		l			1		3			3		3	
CO2		2			2		3			3		3	
CO3		3			3		3	ĺ		3		3	
CO4		3			3		3			3		3	
CO5		3			3		3			3		3	
CO 6		3			3		3			3		3	
Average	2	.5		2	2.5		3	ĺ		3		3	
	C)-I	PO Maj	pping M	atrix for	Course	MTech	/CSE/I	PT/1/C	C1	ļ		
COs	PO	l	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		3	1	1	1	1	-	-	-	-	1	3





CO2	2	1	1	3	1	1	-	-	-	-	2	3
CO3	3	1	1	3	3	1	-	-	-	-	3	3
CO4	3	3	1	3	1	1	-	-	-	-	3	3
CO5	3	1	1	1	3	1	-	-	-	-	3	3
CO 6	3	3	3	3	3	1	-	-	-	-	3	3
Average	2.5	2	1.33	2.33	2	1	-	-	-	-	2.5	3
CO-PSO Mapping Matrix for Course: MTech/CSE/PT/1/CC1												
COs PSO1 PSO2 PSO3 PSO4 PSO5											5	
CO1		3		2		1			-		3	
CO2		3		2		2			-		3	
CO3		3		2		3			-		3	
CO4		3		2		3			-		3	
CO5		3		2		3			-		3	
CO 6		3		2		3			-		3	
Average	3 2 2.5 - 3											
Unit - I	M Databas Independ Constrai Inheritan specializ model C	ITech/C se Syste dence, I ints and nce, Sp zation ar Constrain	SE/PT/2 m Cond ER Diag Relatic becialization d Gener ts and R	Course I/CC1: A cepts and grams, N onal Dat tion an ralization elational	e Conto Advance ad Arcl aming abase S d Ger a. Relati Databa	ent ed Datal nitecture conventio Schemas, eralizatio onal Moo use Schem	Dase Sy : Thre ons an EER on, Co del: Re nas	y stems e - Sc d Desi model onstrai elationa	hema i ign Issu : Subc nts ar il Mode	Archite ues. Re lasses, nd cha el Conce	cture ar lational Super racteriss epts, Re	nd Data Model classes, tics of lational
Unit - II	Informa forms b Decomp Data De SQL.	al design based or bosition, ofinition	n guide Priman Multiva and Data	lines for ry keys: ilued dep a types, S	Relat 1NF, pendend Specify	ional scl 2NF, 31 cies and ing Basic	hemas: NF and 4NF, . Const	Funct d BCN JOIN of raints a	tional 1 NF, Pro depende and Que	Dependo operties encies a eries in	encies, of Re and 5N SQL, V	Normal lational F. SQL 'iews in
Unit - III	Introdu Database algorithi	e recove m, Shade	Trans Try technow pagir	saction niques: I ng, Datab	proces Deferre base sec	sing: Co 1 update urity issu	oncepts and Ir	, Cono nmedia	currenc ate upd	y cont late, Al	rol tech RIES Ro	nniques, ecovery
Unit - IV	Unit - IVData Warehousing: Components, Building a data warehouse, Data extraction, cleanup and transformation, OLAP Future Trends in data models: Semantic data models, Active and Spatial databases, Temporal databases, Multimedia databases, Distributed Database concepts and Client Server Architecture											
			Т	ext/Refe	rence	Books						
Text Books	1. Elm 2. Kor	asri&Na th&Silbe	vathe: Ferschatz:	undamer Databas	ntals of e Syste	Database m Conce	e Syster pt, 4e,	m, 3e, McGra	Addiso w Hill	n Wesle Interna	ey, New tional E	Delhi. dition.

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Reference Books	1. C.J. Date: An Introduction to Database System, 7e, Addison Western New Delhi.	
	2. Abbey Abramson & Cory: ORACLE SI-A Beginner's Guide Tata McGraw I	Hill
	Publishing Company Ltd.	
	3. Hector G.M., Ullman J.D., Widom J., "Database Systems: The Complete Boc	ok",
	Pearson Education.	

MTech/CSE/PT/1/CC2: Advanced Data Structures												
Course Type	Course	Contact	Delivery	Maximu	m Marks	Exam	Assessment					
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods					
Compulsory Theory	04	04	Lecture	70	30 20 5 5	3 Hours	TEE/MTE/ Assignment/ Attendance					

Course Objectives: The objective is to make students to learn different algorithms analysis techniques, analyse the efficiency of algorithm, apply data structures and algorithms in real time applications.

Course Outcomes	At the end of this cou	At the end of this course, the student will be able to:								
CO1	identify: data type, time and space complexity, stack, queue, linked list, trees, graph, searching sorting and hashing									
CO2	understand and expl searching, sorting, ar	understand and explain: abstract data types, stack, queue, linked list, tree, and graph, searching, sorting, and traversing algorithms and hashing function.								
CO 3	apply and use: vario traversal operation, g techniques on data.	apply and use: various data types, algorithms, stack, queue and link list operations, tree traversal operation, graph representation and traversals algorithms, and searching sorting techniques on data.								
CO 4	distinguish: time an linked list, binary, A Dijkstra's and Kruska	d space complexity VL, B tree and mult al's algorithm, variou	, stack and que iway search tre us searching an	eue, single, double e, depth and breadth d sorting techniques.	and circular first search,					
CO5	select: algorithm, dat in a given situation.	a representation tech	nnique, searchi	ng and sorting techn	ique suitable					
CO 6	design: algorithm, sta	ack, queue, linked lis	st, trees, graph,	searching, sorting an	d hashing.					
	CO-PEO Mappi	ng Matrix for Cou	rse MTech/CSI	E/PT/1/CC2						
COs	PEO1	PEO2	PEO3	PEO4	PEO5					





CO1		1			1		3			3			3	
CO2		2			2		3			3			3	
CO3		3		3			3			3			3	
CO4		3			3			3		3			3	
CO5		3			3					3			3	
CO 6		3			3		3			3			3	
Average		2.5		,	2.5		3			3			3	
	С	O-PO I	Марріі	ng Matri	x for C	ourse	MTecl	/CSE	E/PT/	/1/CC2	1	1	T	
COs	PO1	P02	P03	PO4	PO5	PO6	PO7	000	PU8	909	P010	P011	P012	
CO1	1	3	1	1	1	-	-		-	-	-	1	3	
CO2	2	1	1	3	1	-	-	ĺ	-	-	-	2	3	
CO3	3	1	1	3	3	-	-		-	-	-	3	3	
CO4	3	3	1	3	1	-	-		-	-	-	3	3	
CO5	3	1	1	1	3	-	-		-	-	-	3	3	
CO 6	3	3	3	3	3	-	-		-	-	-	3	3	
Average	2.5	2	1.33	2.33	2	-	-		-	-	-	2.5	3	
	CO)-PSO	Mappi	ng Matri	ix for C	ours	e MTec	h/CS]	E/PI	C/1/CC2	2			
COs		PSO1		PSO2			PSO3			PS	04		PSO5	
CO1		3		3			1			-	-		3	
CO2		3		3			2			-	-		3	
CO3		3		3			3			-	-		3	
CO4		3		3			3			-	-		3	
CO5		3		3			3			-	-		3	
CO 6		3		3			3			-	-		3	
Average		3		3			2.5			-	-		3	
		MTech	/CSE/I	Cour PT/1/CC2	rse Con 2: Adva	itent inced	Data S	truct	tures					
Unit - IIntroduction to algorithms: abstract data types, role of algorithms in computing, performance analyzing algorithms, designing algorithms, time-Space trade-offs growth of functions, asymptotic notations, Recurrences: master, substitution, recurrence tree method.														
Unit - II	ADT: st	ack, op ns perfo	peration ormed o	us on stat on linked	cks, qu list.	eue &	kits vai	iation	ns, op	peration	is, type	es of li	nked list	





	Trees: representation, traversals, operations, applications, binary search trees, AVL trees, Splay trees, B-trees, m-way search tree, implementation of threading on binary trees.								
Unit - III	III Graphs : : representation, traversals(BFS, DFS, Topological sort), operations, applications shortest path algorithms (Dijkstra's), minimum spanning trees, algorithms for finding minimum spanning tree (Kruskal, Prim's), Graph coloring.								
Unit - IV	 Sorting and Searching: linear search, binary search, insertion sort, Shell sort, Heap sort, Merge sort, Quick sort, Bubble sort, Bin sort, Radix sort. Hashing: hash Function, collision resolution, deletion, perfect hash functions, hash functions for Extendible files. 								
	Text/Reference Books								
Text Books	 Seymour lipschutz, Data structures with C, MacGraw Hill. Adam Drozdek, Data Structures and Algorithm in C++, India Edition. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley. 								
Reference Books	 Alfred V. Aho, John E.Hopcroft, Jeffrey D.Ullman, Data Structures and Algorithms, Pearson Education. Ellis Horowitz,SartajSahni,SanguthevarRajasekaran, Fundamental of Computer Algorithms, 2e,Universities Press. YedidyahLangsam, Moshe J.Augenstein, A. M.Tenebaum, Data Structures using C and C++, 2e, Pearson Education 								

	MTech/CSE/PT/1/DSC1(i): Network Security											
Course Type	Course	Contact	Delivery	Pelivery Maximum Marks Exam								
	Credit	Hours/ Week	Mode	External	Internal	Duration	Methods					
Optional	04	04	Lecture	70	30	3 Hours	TEE/MTE/					
Theory					20 5 5		Assignment/ Attendance					

Course Objectives: To study fundamental concepts of Network Security, security attacks, cryptography, authentication, web security, system and email security.

Course Outcomes	At the end of this course, the student will be able to :
CO1	define: computer security, security standards, cipher model, encryption techniques, data encryption standards, public-key cryptography, security at transport layer, SSL/TSL attacks, wireless security and IEEE 802.11i.





CO2	expla adva	ain: co nced e	mpute	er conc otion st	epts rel andard,	ated RSA	with t A, cond	he secu cept of	ırity di	r, symr gital s	netric ignatu	techi re, so	niques, ecurity
CO3	prote illust	istrate: features related with computer security, encryption techniques, data											
203	encry	cryption standards, security at transport layer and wireless LAN security.											
CO4	class	ify: inf	formation	tion ab	out secu	ırity,	its arc	hitectur	e, ty	ypes of	f attac	ks, s	ecurity
	mech	nanism, rity	encry	yption s	tandards	s, pro	tocols	at trans	port	layer a	and w	ireless	S LAN
CO5	evalu	ate: se	curity	trends,	security	mech	nanisms	, cipher	mo	del, RS	A, Dif	fie-H	ellman
	key o	exchang	ge, tra	insport	layer se	curity	, SSL/7	SL atta	icks,	, wirele	ss sec	urity	and IP
	secui	rity.											
CO-P	'EO I	Mappir	ıg Ma	trix for	Course	e MTe	ech/CS	E/PT/1/	DSC	C1(i)		1	
Cos	P	EO1		PEC	02		PEOS			PEO4		Pl	EO5
CO1		1		1			3			3			3
CO2		2	Ì	2		Ì	3			3			3
CO3		3		3			3			3			3
CO4		3 3 3 3								3			
CO5		3 3 3 3								3			
Average		2.4 2.4 3 3 3											
CO-I)-PO Mapping Matrix for Course MTech/CSE/PT/1/DSC1(i)												
Cos											0		2
	PO1	P02	P03	P04	PO5	P06	P07	P08		604	010	01	010
											Р	Ц	Р
CO1	1	3	1	1	1	2	-	-	-	-	-	1	3
CO2	2	1	1	3	1	2	-	-		-	-	2	3
CO3	3	1	1	3	3	2	-	-	-	-	-	3	3
CO4	3	3	1	3	1	2	-	-		-	-	3	3
CO5	3	1	1	3	3	2	-	-	-	-	-	3	3
Average	2.4	1.8	1	2.6	1.8	2	-	-	•	-	-	2.4	3
CO-F	SO I	Mappin	ıg Ma	trix for	Course	e MTe	ech/CS	E /PT/1 /	DSC	C1(i)			
Cos		PSO	l		PSO2		P	503		PSO	4	P	SO5
CO1		3			3			1		-			3
CO2	Ì	3 3 2 -						3					
CO3		3			3		3		-			3	
CO4		3 3 3 - 3							3				
CO5		3			3			3		-			3

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Average	3	3	2.4	-	3			
	MTech/CSE/P'	Course Content T/1/DSC1(i) Netw	vork Security					
Unit – I	Computer Security C nformation system, security mechanisms Cipher model, crypta symmetric techniqu machines, steganogra	Concepts – Introduc OSI security arch , security standards analysis and brute- es – substitution aphy.	ction, security, se nitecture, security 3. force attack, clas techniques, trai	ecurity trends, co attacks, goals sical encryption nsposition tech	omponents of for security, techniques – niques, rotor			
Unit – II	Fraditional block ci advanced encryption Public-key cryptogra Hellman key exchan	ipher; data encryp standard – structur aphy – principles, ge. Concept of digi	otion standard – e and expansion applications and tal signature.	encryption and functions. requirements;	d decryption, RSA, Diffie-			
Unit – III	Security at Transport Layer, web security considerations, Transport Layer Security, TLS record protocol, change cipher spec protocol, alert protocol, handshake protocol, heart-beat protocol; SSL/TSL attacks; HTTPS; Secure shell; user authentication protocol, connection protocol							
Unit – IV	Wireless Security, w strategy. Wireless LAN securi Email security, S/MI	vireless security m ity, IEEE 802.11i - ME, PGP, overviev	easures, mobile of services, operation wo f IP security.	device security on and phases.	- threats and			
	Tez	xt/Reference Book	(S					
Text Books	 William Stalling Pearson Education Forouzan, Mukh 	şs, Cryptography A on 10padhyay, Cryptoş	nd Network Secu graphy & Networ	urity Principles k Security, McC	And Practice, Graw Hill			
Reference Book	 AtulKahate, Cry Godbole, Inforn Security Princip 	ptography and Net nation Systems Sec les and Practice, W	work Security, T curity, Wiley Inc 'illy India	MH dia Mark Stamp	, Information			





	MTech/CSE/PT/1/DSC1(ii):Advanced Computer Networks											
Course	Course Contact		Delivery	Maximu	m Marks	Exam	Assessment					
Туре	Credit	Hours/ Week	Mode	External	Internal	Duration	Methods					
Optional Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/ Attendance					

Course Objectives: The objective of this course is to get the students familiar with various networking models, different IP addressing, wireless LANS and latest network technologies.

Course Outcomes	At the end of this	course, the stude	nt will be able to:						
CO1	define: computer networking including network models, media for transmission,IEEE standards, logical addressing, routing protocols, domain name system, world wide web, HTTP, FTP and wireless LANs.								
CO2	explain: various concepts of computer networking including network models, media for transmission along with the standards followed, logical addressing, routing protocols, domain name system and wireless LANS.								
CO3	apply: techniques learnt here in the design and evaluation of computer networks and decide which network models, routing protocols, logical addressing, transmission media or wireless LAN will suit a particular situation.								
CO4	categorize: computer networks, network models, routing protocols, logical addressing, transmission media and wireless LANs.								
CO5	choose: IEEE standards, unicast and multicast routing protocols, logical addressing, transmission media and wireless LANs.								
CO	-PEO Mapping	Matrix for Cours	se MTech/CSE/P	T/1/DSC1(ii)					
Cos	PEO1	PEO2	PEO3	PEO4	PEO5				
CO1	1	1	3	3	3				
CO2	2	2	3	3	3				
CO3	3	3	3	3	3				
CO4	3	3	3	3	3				
CO5	3	3	3	3	3				
Average	2.4	2.4	3	3	3				
C	O-PO Mapping N	Aatrix for Cours	e MTech/CSE/P7	Г/1/DSC1(ii)					



Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12									
CO1	1	3	1	1	1	-	-	-	-	-	1	3									
CO2	2	1	1	3	1	-	-	-	-	-	2	3									
CO3	3	1	1	3	3	-	-	-	-	-	3	3									
CO4	3	3	1	3	1	-	-	-	-	-	3	3									
CO5	3	1	1	3	3	-	-	-	-	-	3	3									
Average	2.4	1.8	1	2.6	1.8	-	-	-	-	-	2.4	3									
CO-PSO Mapping Matrix for Course MTech/CSE/PT/1/DSC1(ii)																					
Cos		PSO1		PS	502		PSO3		PSO ₄	4	PSO	05									
CO1		3			3		1		-		3										
CO2		3			3		2		-		3										
CO3		3			3		3		-		3										
CO4		3			3		3		-		3										
CO5		3			3		3		-		3										
Average	3 3 2.4 -							3													
Course Content MTech/CSE/PT/1/DSC1(ii): Advanced Computer Networks																					
Unit I I	Networ Fransm Connec Etherne	k Mod ission ting L t: IEE	els: OS Media ANs: O E Stan	SI refere : Guideo Connecti dards, S	ence mo l Media ng Dev tandard	del, TO , Ungu ices, B Etherr	CP/IP r ided N ackbor net, Far	reference Aedia. ne Netw st Ether	e model vorks. met, Gig	abit Eth	ernet.										
Unit - II I	Logical Unicast Intrado	Addre Routi main a	essing: ng Pro nd Inte	IPv4 A tocols a erdomain	ddresses nd Mult n Routin	s, IPv6 icast R ng Prot	Addre Couting	esses. g Protoc	cols												
Unit - III	Unit - III Wireless LANs: IEEE 802.11, Bluetooth Wireless Network and Mobile Network: LAN, PAN, Sensor Networks and Adhoc Networks. Mobile IP ATM reference model																				
Unit - IV World Wide Web and HTTP, FTP, E-Mail. Domain Name System: Name Space, Domain Name Space, Distribution of Name Space, DNS in the Internet, Resolution. Voice Over IP, IPSec, DDoS Attack										e											
Text/Reference Books																					
Text Books	 Lar 4e, Jean Mo 	ry L. I Morga n Walr rgan K	Peterson N Kau and an auffm	on and E fmann, 2 id Pravis an, 1999	Bruce S. 2007. nVaraiy 9.	. Davie a, Higl	e, Con h Perfo	oputer 1	Network e Comm	s: A Sys unicatio	stems Aj n Netwo	Text Books 1. Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, 4e, Morgan Kaufmann, 2007. 2. Jean Walrand and PravinVaraiya, High Performance Communication Networks, 2e, Morgan Kauffman, 1999									





	3. Markus Hoffmann and Leland R. Beaumont, Content Networking: Architecture, Protocols, and Practice, Morgan Kauffman, 2005.
Reference Books	1. Behrouz A. Forouzan, Data Communications and Networking, 4e, Tata McGraw Hill, 2006.

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MTech/CSE/PT/1/DSC1(iii): Wireless Networks										
Course	Contact	Delivery	Maximu	m Marks	Exam	Assessment				
Credit	Hours/ Mode Week		External	Internal	Duration	Methods				
04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/				
	Course Credit 04	MTech/CSE/CourseContactCreditHours/ Week0404	MTech/CSE/PT/1/DSC1(iiCourseContactDeliveryCreditHours/ WeekMode0404Lecture	WTech/CSE/PT/1/DSC1(iii): WirelessCourse CreditContact Hours/ WeekDelivery ModeMaximu External0404Lecture70	MTech/CSE/PT/1/DSC1(iii): Wireless NetworksCourse CreditContact Hours/ WeekDelivery ModeMaximum Marks0404Lecture70300404Lecture7055	MTech/CSE/PT/1/DSC1(iii): Wireless NetworksCourse CreditContact Hours/ WeekDelivery ModeMaximum Marks ExternalExam Duration0404Lecture70303 Hours				

Course Objectives: To study fundamental concepts in wireless network, various LAN standards, IP and IPV6 Layer, Transmission protocols and WAN standards.

Course Outcomes	At the end of	this course, the stu	ident will be able	to:		At the e						
CO1	define: wirel and wireless	ess LAN, architec wide area network.	ture, mobile netv	vork layer, mobile	transport layer	wireless						
CO2	describe: WI mobile ad-ho 3G-SGSN, 3	AN technologies, c network, TCP en G-GGSN, applicati	IEEE 802.11 type hancements for w ons of 4G, feature	es, IEEE 802.16, B vireless network, U' es and challenges of	luetooth, IPV6, ΓMS, 3G-MSC, 5 G.	mobile						
CO3	illustrate: wir architecture, improvement 5G.	strate: wireless LAN, system architecture, physical layer, Mac layer, Bluetooth nitecture, mobile IP, mobile ad-hoc network, mobile transport layer, TCP rovements, wireless wide area network, HSDPA, features and challenges of 4G,										
CO4	analyze: WL enhancement 3G,4G and 5	alyze: WLAN technologies, 802.11b, 802.11a, IEEE 802.16, IPV6, Routing, TCP hancements, TCP improvements, UMTS core network architecture, firewall, G,4G and 5G networks.										
CO5	compare: di transport lay and wireless	compare: different Wireless LAN technologies, mobile network layer, mobile transport layer, Mobile IP, mobile ad-hoc networks, protocols, TCP improvements and wireless WAN types.										
C	O-PEO Mapp	ing Matrix for Co	urse MTech/CSE	C/PT/1/DSC1(iii)								
COs	PEO1	PEO2	PEO3	PEO4	PEO5							
CO1	1	1	3	3	3							
CO2	2	2	3	3	3							
CO3	3	3	3	3	3							
CO4	3	3	3	3	3							
CO5	3	3	3	3	3							
Average	2.4	2.4 2.4 3 3 3										
(CO-PO Mappi	ng Matrix for Cou	irse MTech/CSE/	/PT/1/DSC1(iii)								



Cos	P01	P02	PO3	P04	PO5	P06	PO7	P08	909	PO10	PO11	P012
	1	2	1	1	1						1	2
COI		5	1	2		-	-	-	-	-	1	2
<u> </u>	2	1	1	2		-	-	-	-	-	2	3
C03	2	1	1	2	3	-	-	-	-	-	2	2
C04	2	5	1	2		-	-	-	-	-	2	2
CO5	3	1.0	1	3	3	-	-	-	-	-	3	2
Average	$ ^{2.4}$	1.8 Mon	¹ ning M	2.0	1.8	- MTaab	- /CSE/I	-))T/1/DS/	-	-	2.4	5
CO-PSO Mapping Matrix for Course MTech/CSE/PT/1/DSC1(iii)												
COS	F k	2	Г	2		1		F30	J4		rs	2
<u> </u>		3		3		2		-			•	3 2
C02		2 2		2 2		2		-				
C03		3 2		3		3 -		-				
C04		3		3		3		-			3	
COS		3		3		3		-				3
Average		3		3		2.4		-				3
	N	/ITech/	CSE/P	Cours T/1/DSC	e Conter C1(iii): V	nt Vireless 1	Netwoi	rks				
Unit – I Unit - II	Wireless spectrum layer, 8 Archite IEEE80 Mobile tunnelin	s LAN m -IEE 302.11b cture, 02.16-W Netwo ng and	: Intro E802.1 o, 802. Radio /IMAX rk Lay encaps	duction-' 1: Syster 11a – H Layer, 2: Physic er: Introd sulation, mobile	WLAN t m archite liper LA Baseban al layer, duction - IPV6- N	echnolog ecture, pr N: WA nd layer MAC, Sj Mobile letwork	gies: Ir rotocol TM, E r, Link pectrum IP: IP layer in Routin	nfrared, U architecti BRAN, H c manag n allocati packet do n the into g Destin	JHF na ure, ph liperLA er Pro on for elivery, ernet-	arrowb ysical AN2 – otocol, WIMA , Agen Mobile	and, layer, Blue secu X. t disc e IP s	spread MAC etooth: rity - overy, ession stance
	vector,	Dynam	ic sour	ce routin	ig.	etwork:	Koutin	g, Destin		sequen		stance
Unit - III	Unit - III Mobile Transport Layer :TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks.									TCP: assical ezing, rks.		
Unit - IV	Wireles UMTS GMSC/ (HSDP, Applica	S Wide Core SMS-I A)- LT tions o	e Area netw WMSC E netv f 4G, Ii	Network ork Ar 2, Firew work arc ntroducti	c: Overvi chitectur all, DN chitecture on to 5G	iew of U e: 3G- S/DHCP e and pr vision,5	JTMS MSC, -High otocol, G featu	Terrestria 3G-SGS speed I features ures and c	I Radi SN, 3 Downlin and c challen	o acce G-GG nk pao challen ges.	ss net SN, cket ges c	twork- SMS- access of 4G,





Text/Reference Books									
Text Books	 Jochen Schiller, "Mobile Communications", 2e, Pearson Education 2012. Vijay Garg, "Wireless Communications and Networking", 1e, Elsevier, 2007. 								
Reference Books	 William Stallings, Wireless Communications and Networks, Pearson/Prentice Hall of India. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", 2e, Academic Press, 2008. Anurag Kumar, D. Manjunath, Joy Kuri, "Wireless Networking", 1e, Elsevier 2011. Simon Haykin, Michael Moher, David Koilpillai, "Modern Wireless Communications", 1e, Pearson Education, 2013. 								
MTach/CSF/DT/	1/CC3.Software Lab based on MTeeb/CSE/DT/1/CC1 (implementation in DL/SOL)								

Course Type	Course	Contact	Delivery Maximum Marks		m Marks	Exam	Assessment			
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods			
Practical	02	04	Lab Work	50	-	3 Hours	TEE/ Practical File			

Instructions to paper setter for Final Term Examination: The Final Term examination will be conducted by a panel of internal and external examiners. Examinees will be evaluated on the bases of practical file, performance in practical and a viva voce exam.

Course Objectives: The objective of this course is to get the students hands on practice with advanced concepts of database (as covered in course MTech/CSE/PT/1/CC1) and their implementation in PL/SQL.

Course Outcome	At the end of t	his course, the stud	ent will be able to:						
CO1	define: 3-sche	ma architecture, EF	R diagrams, EER me	odel, functional dep	endencies, normal				
	forms, data typ	pes, views in SQL,	concurrency contro	l techniques, databa	ase security issues,				
	semantic data	semantic data models, and client server architecture.							
CO2	discuss: ER d	liagram, relational	model, EER mod	lel, functional dep	endencies, normal				
	forms, SQL c	onstraints and view	s, recovery technic	ques, data warehou	se, and distributed				
	databases.								
CO3	apply: inheri	tance, SQL querie	es, normal forms,	SQL constraints, d	lependencies, data				
	security, concu	irrency control and	recovery technique	s on database.					
CO4	differentiate:	subclass, super c	lass, inheritance,	SQL queries, nor	mal forms, SQL				
	constraints, fu	constraints, functional dependencies, data security, concurrency control and recovery							
	techniques.	techniques.							
CO5	justify: subcla	justify: subclass, super class, inheritance, SQL queries, normal forms, SQL constraints,							
	functional dep	endencies, data sec	urity, concurrency of	control and recover	y techniques.				
CO 6	design: databa	se for a particular a	pplication.						
	CO-PEO Ma	apping Matrix for	Course MTech/CS	SE/PT/1/CC3					
COs	PEO1	PEO2	PEO3	PEO4	PEO5				
CO1	1	1	3	3	3				
CO2	2	2	3	3	3				
CO3	3	3	3	3	3				
CO4	3	3	3	3	3				





CO5	3		,	3		3		3			3	
CO 6	3		,	3		3		3			3	
Average	2.5	i	2	.5		3			3		3	
	CO	PO Maj	pping Ma	atrix for	Cours	se MTech	/CSE/I	PT/1/C	CC3			
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	1	1	1	-	-	-	-	1	3
CO2	2	1	1	3	1	1	-	-	-	-	2	3
CO3	3	1	1	3	3	1	-	-	-	-	3	3
CO4	3	3	1	3	1	1	-	-	-	-	3	3
CO5	3	1	1	1	3	1	-	-	-	-	3	3
CO 6	3	3	3	3	3	1	-	-	-	-	3	3
Average	2.5	2	1.33	2.33	2	1	-	-	-	-	2.5	3
	CO-l	PSO Maj	pping M	atrix for	Cours	se: MTec	h/CSE	/PT/1/	CC3			
COs	F	SO1		PSO2	PSO3 PSO4 PSO				PSO	5		
CO1		3		2		1		-			3	
CO2		3		2		2			-		3	
CO3		3		2		3			-		3	
CO4		3	2			3			-		3	
CO5		3		2		3			-		3	
CO 6		3		2		3		-			3	
Average		3		2		2.5			-		3	

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MTech/CSE/PT/2/CC4: Advanced Web Technology											
Course Type	rse Type Course Contact		Delivery	Maximu	m Marks	Exam	Assessment				
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods				
Compulsory Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/ Attendance				

Course Objectives: The objective of this course is to get the students familiar with different concepts related with HTML, Java Scripts, Search Engines and CMS.

Course Outcome	es At the end of	this course, the stud	lent will be able to:							
CO1	define: the ba MySQL, searc	sic concepts of H ² ch engine and conte	TML, CSS, XHTM nt management sys	IL, HTML5, XML tems.	, JavaScript, PHP,					
CO2	describe: HTM with PHP & M	describe: HTML common tags,HTML5 capabilities and use of XML, JavaScript concept with PHP & MySQL, search engine techniques and optimize search results.								
CO3	perform: HTM search engine technologies.	perform: HTML tags with XML, JavaScript with PHP and MySQL queries, optimize search engine result using SEO techniques, Webhosting and different type of CMS technologies.								
CO4	illustrate: rela ranking using Wordpress, Jo	Ilustrate: relationship of HTML with XML, building query on tables and forms, improve canking using search engine optimization techniques, analyze different CMS like Wordpress, Joomla and Drupal with help of their features.								
CO5	compare: HTM determine: cli evaluate: quer choose: effect	compare: HTML with HTML5, relationship of HTML, SGML and XML. determine: client side or server side JavaScript. evaluate: queries on table and forms using MySQL. choose: effective plan to achieve higher ranking in search results.								
CO6	design: webpa MySQL in we create: blog or	design: webpages using HTML,CSS,XML and JavaScript, generate various query using MySQL in webpages, modify webpages to achieve higher ranking in search engine. create: blog or websites using Content Management System.								
	CO-PEO M	apping Matrix for	Course MTech/CS	SE/PT/2/CC4						
COs	PEO1	PEO2	PEO3	PEO4	PEO5					
CO1	1	1	3	3	3					
CO2	2	2	3	3	3					
CO3	3	3	3	3	3					
CO4	3	3	3	3	3					
CO5	3	3	3	3	3					
CO6	3	3	3	3	3					
Average	2.5	2.5	3	3	3					



CO-PO Mapping Matrix for Course MTech/CSE/PT/2/CC4												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	1	1	-	-	-	-	-	1	3
CO2	2	1	1	3	1	-	-	-	-	-	2	3
CO3	3	1	1	3	3	-	-	-	-	-	3	3
CO4	3	3	1	3	1	-	-	-	-	-	3	3
CO5	3	1	1	3	3	-	-	3	3			
CO6	3	3	3	3	3	-	-	-	-	-	3	3
Average	2.5	2.5 2 1.33 2.66 2									2.5	3
	CO-I	PSO Ma	pping M	latrix fo	r Cour	se MTec	h/CSE/	PT/2/0	CC4	ļ	ļ.	<u>!</u>
COs	P	SO1		PSO2		PSO3	3	F	PSO4		PSO	5
CO1		3 3 1 - 3										
CO2		3 3 2 - 3										
CO3		3		3		3			-		3	
CO4		3		3		3		-		3		
CO5		3		3		3			-		3	
CO6		3		3		3			-		3	
Average		3		3		2.5			-		3	
]	MTech/	CSE/PT	Cours /2/CC4:	e Cont Advar	ent iced Web	Techn	ology				
Unit - I	Overviev sheets, Σ XML, T	w of HT KML rela he future	ML: Con ationship e of XMI	nmon taş betweer L.	gs, XH 1 HTM	TML, cap L, SGML	abilitie ., and X	es of H KML, E	TML5, Basic X	Cascad ML, wa	ing Sty ys to us	le e
Unit – II	Java Scr PHP/My Cookies	ipt: Intro /SQL Fu	duction, nctions,	, Client-S displayir	Side Jav ng quer	vaScript, ies in tab	Server- les, Bu	Side Ja ilding I	vaScri Forms f	pt, PHP from qu	and My eries, Se	ySQL: essions,
Unit – III	Search E Optimiza intervals	Engines: ation (SI 5.	Searchir EO), Effe	ng technic ective co	ques us ntent w	sed by sea vriting pla	arch eng in, Ach	gines, H ieving	Keywor high ra	rds, Sea nkings,	rch Eng SEO ar	ine alysis
Unit – IV	CMS: In CMS Te Hosting	troduction chnologiand Pub	on, types ies: Wor lishing C	s, archite dPress, I Concepts.	cture. Drupal,	Joomla,	Websit	e Creat	ion and	1 mainte	enance,	Web
			T	ext/Refe	erence	Books						
 Text Books. Peter Smith, "Professional Website Performance", Wiley India Pvt. Ltd. Kogent Learning, "Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML, AJAX - Black Book", Wiley India Pvt. Ltd.' J. C. Jackson, "Web Technologies", Pearson Education, 												





Reference Books	1. Steven Holzner, PHP: The Complete Reference, Tata McGraw Hill
	2. DT Editorial Services, "HTML 5 Black Book", 2e, Wiley India, 2016.
	3. S. Potts, "JAVA 2 Unleashed", 6e, Sams Publishing, 2002

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MTech/CSE/PT/2/CC5:Advanced Computer Architecture												
Course Type	Course	Contact	m Marks	Exam	Assessment							
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods					
Compulsory	04	04	Lecture	70	30	3 Hours	TEE/MTE/					
Theory							Assignment(s)/ Attendance					

Course Objectives: The objective of this course is to get the students familiar with different concepts related to computer architecture.

Course Outcomes	At the end of th	is course, the stud	ent will be able to:									
CO1	define: concept collision free segmentation, r	letine: concepts of parallel processing, computer architecture, principles of pipeline, collision free scheduling, ILP processors, branch handling, TLB, paging, segmentation, memory hierarchy technology, distributed and shared MIMD. inderstand and explain: parallel processing, computer architecture, principles of										
CO2	understand and pipeline, collis segmentation, distributed and	nderstand and explain: parallel processing, computer architecture, principles of ipeline, collision free scheduling, ILP processors, branch handling, TLB, paging, egmentation, memory hierarchy technology, switching and routing techniques, istributed and shared MIMD.										
CO3	illustrate difference segmentation, coherence prob	lustrate different types of: computational models, pipeline, scheduling, TLB, paging, egmentation, cache performance, network interconnection topologies, cache oherence problem and switching network.										
CO4	categorize: leve paging and segr	aging and segmentation, UMA, NUMA, CC-NUMA and COMA multiprocessors.										
CO5	relate: concurrent and parallel execution, dependencies between instruction, synchronous and asynchronous pipeline, different code scheduling and hardware based cache coherence protocols.											
	CO-PEO Mapp	ing Matrix for C	ourse MTech/CSE/	/PT/2/CC5								
COs	PEO1	PEO2	PEO3	PEO4	PEO5							
CO1	1	1	3	3	3							
CO2	2	1	3	3	3							
CO3	3	1	3	3	3							
CO4	3	1	3	3	3							
CO5	3	1	3	3	3							
Average	2.4	1	3	3	3							
	CO-PO Mappi	ng Matrix for Co	urse MTech/CSE/	PT/2/CC5								





COs	01	02	03	04	05	06	07	08	60	010	011	012	
	Ā	P	Ā	A	Ъ	P	Ъ	Р	Ъ	PC	P(РС	
CO1	1	3	1	1	1	-	-	-	-	-	1	3	
CO2	2	1	1	3	1	-	-	-	-	-	2	3	
CO3	3	1	1	3	3	-	-	-	-	-	3	3	
CO4	3	3	1	3	1	-	-	-	-	-	3	3	
CO5	3	1	1	3	3	-	-	-	-	-	3	3	
Average	2.4	1.8	1	2.6	1.8	-	2.4	3					
	CO-P	SO Ma	pping	Matrix	x for C	ourse N	/ITech/(CSE/P1	r/2/CC	5			
COs	PSO1 PSO2 PSO3 PSO4 PSO5												
CO1		3		1			1		-		3		
CO2		3		1			2		-		3		
CO3		3		1			3		-		3		
CO4		3		1			3		-		3		
CO5		3		1			3		-		3		
Average		3		1		2	2.4		-		3		
	МТ	ob/CSI	Г/ D Т/		urse C	ontent	mnutor	Arabit	ooturo				
Unit - I	Concu of pa archit Instru Pipeli Linea linear data f	arrent a rallel p ectures ction-L ning. F r Pipel pipelin orwardi	nd Par proces evel-F Pipelin ine-clo ne- res	rallel Ex sing, T earallel ed instr ocking servatio	ecutio ypes a Proces ruction & tim n table	n: Von-J nd leve sors: De proces ing con e, latenc	Neuman els of p ependen sing, Sy ttrol, sp ey analy	in comporable paralleli cies be ynchror eedup, ysis, co	outation ism, Cl tween in nous & efficien Illision	al mode assifica nstructi Asyncl ncy & free sch	el, Basic tions cons, Pri nronous through neduling	c concepts of parallel nciples of pipeline, nput, Non g, internal	
Unit - II	Introd Princi delaye sched	luction ples of ed bran uling- b	to ILF pipel ching basic b	P proces ining, P branch lock scl	erform proce	Evoluti aance m essing, 1 ag, loop	on of II easures, multiwa schedul	LP, Dep VLIW y brand ing, glo	bendenc archite ching, g bbal sch	ies betw ecture, guarded eduling	veen in Branch execut	structions, handling- ion, Code	
Unit - III	Memory Hierarchy Technology : inclusion, coherence and locality, virtual memory models, TLB, paging and segmentation, memory replacement policies, cache addressing models, cache performance issues, interleaved memory organization. Distributed MIMD architectures: Direct interconnection networks-interconnection topologies, switching techniques, routing												
Unit - IV	Share netwo	d MIM orks- cro	D arch ossbar	nitecture & mul	es: Dyn tistage	amic in networ	terconn ks. Cacl	ection 1 ne cohe	network erence p	s- share roblem	ed path, , Hardw	switching are based	





	cache coherence protocol- Snoopy cache protocol, Directory scheme, and hierarchical cache coherence protocol. UMA, NUMA, CC-NUMA and COMA multiprocessors.								
Text/Reference Books									
Text Books	 Hennessy J.D., Patterson D.A., "Computer Architecture A Quantitative Approach", Elsevier India. Sima D., Fountain T., Kasuk P., "Advanced Computer Architecture-A Design Space Approach," Pearson Education. 								
Reference Books	 Kai Hwang, "Advanced Computer Architecture – Parallelism, Scalability, Programmability", Tata McGraw Hill. 								



	MTech/CSE/PT/2/DSC2(i): Soft Computing												
Course Type	Course	Contact Hours/	Delivery	Maximu	m Marks	Exam	Assessment						
	Credit	Week	Mode	External	Internal	Duration	Methods						
Optional Theory	04	04	Lecture	70	30 20 5 5	3 Hours	TEE/MTE/ Assignment/ Attendance						

Course Objectives: The objective of this course is to cover fundamental soft computing concepts with an exposure to ANN, fuzzy Logic, optimization techniques using Genetic Algorithm (GA).

Course Outcomes	By the	By the end of this course, the student will be able to:										
CO1	recogni algorith	recognize the concepts of: soft computing and hard computing, simple genetic algorithm, fuzzy set, neuron, neural network and activation function.										
CO2	understand and describe: the role of genetic algorithm operators, representation of fuzzy set and its operation, types of neural network and activation function including their pros and cons.											
CO3	use: algorithm i.e. genetic algorithm , fuzzy logic , ANN and their constituents for solving optimization problem.											
CO4	differer activati analyze	lifferentiate: soft computing and hard computing, operators of genetic algorithm and activation functions of ANN. analyze: fuzzification and defuzzification.										
CO5	compar differer	ompare: soft computing and hard computing, operators of genetic algorithm and lifferent activation functions of ANN.										
CO-PEO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(i)												
COs	F	PEO1		PEC	2		PEO3		F	EO4		PEO5
CO1		1		1			3			3		3
CO2		2		2			3			3	ĺ	3
CO3		3		3			3			3	ĺ	3
CO4		3		3			3			3	Ì	3
CO5		3		3			3			3	ĺ	3
Average		2.4		2.4	1		3			3		3
C	O-PO N	Ларріі	ng Mat	trix for C	ourse N	/Tech/	CSE/	PT/2/E	OSC2(i)		ŗ	
COs	PO1	P02	P03	P04	PO5	PO6 PO7 PO8		P09	P010	P011	P012	





CO1 1 3 1 1 - - - - 1 3 CO2 2 1 1 3 1 - - - - - - 2 3 CO3 3 1 1 3 1 - - - - - 3 3 CO4 3 3 1 3 1 - - - - 3 3 CO4 3 3 1 2 6 1.8 - - - - 2.4 3 CO5 3 1 1 2.6 1.8 - - - 2.4 3				1										
CO2 2 1 1 3 1 - - - - 2 3 CO3 3 1 1 3 3 - - - - - 3 3 CO4 3 3 1 3 1 - - - - 3 3 CO4 3 3 1 1 3 3 - - - - 3 3 CO5 3 1 1 2 6 1.8 - - - - 2.4 3 CO5 3 1 1 2.6 1.8 - - - 2.4 3 CO1 3 3 3 1 - 3 3 3 - 3 3 - 3 3 3 3 3 3 3 - 3 3 3 3 3 <td>CO1</td> <td></td> <td>1</td> <td>3</td> <td>1</td> <td>1</td> <td>1</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>1</td> <td>3</td>	CO1		1	3	1	1	1	-	-	-	-	-	1	3
CO3 3 1 1 3 3 - - - - 3 3 CO4 3 3 1 3 1 - - - - - 3 3 CO4 3 3 1 1 3 3 - - - - - 3 3 CO5 3 1 1 3 3 - - - - 2.4 3 CO-PSO Mapping Matrix for Course MTech/CSE/PT/2/DSC2() - - - 2.4 3 CO2 3 3 1 - - 3 - 3 CO3 3 3 3 1 - - 3 - 3 CO4 3 3 3 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3	CO2		2	1	1	3	1	-	-	-	-	-	2	3
CO4 3 3 1 3 1 - - - - 3 3 CO5 3 1 1 3 3 - - - - - 3 3 Average 2.4 1.8 1 2.6 1.8 - - - - 2.4 3 CO-PSO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(i) COs PSO1 PSO2 PSO3 PSO4 PSO5 CO1 3 3 1 - 3 3 CO2 3 3 1 - 3 3 CO3 3 3 3 - 3 3 - 3 CO4 3 3 3 3 - 3 - 3 CO5 3 3 3 2.4 - 3 - 3 Merage 3 3 2.4 - 3	CO3		3	1	1	3	3	-	-	-	-	-	3	3
CO5 3 1 1 3 3 - - - - - 3 3 Average 2.4 1.8 1 2.6 1.8 - - - - 2.4 3 CO-PSO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(i) PSO4 PSO5 C01 3 3 1 - 3 3 C02 3 3 1 - 3 3 C03 3 3 2 - 3 C04 3 3 3 - 3 C05 3 3 3 - 3 C05 3 3 3 - 3 C04 3 3 3 - 3 C05 3 3 2.4 - 3 C05 3 3 2.4 - 3 C05 3 3 2.4 - 3 Mitch/CSE/PT/2/DSC2(i):Soft Computing Mitch/CSE/PT/2/DSC2(i):Soft Computing, difference between soft and hard computing	CO4		3	3	1	3	1	-	-	-	-	-	3	3
Average 2.4 1.8 1 2.6 1.8 - - - 2.4 3 CO-PSO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(i) CO PSO1 PSO2 PSO3 PSO4 PSO5 CO1 3 3 1 - 3 CO2 3 3 2 - 3 CO3 3 3 3 - 3 CO4 3 3 3 - 3 CO5 3 3 3 - 3 Average 3 3 2.4 - 3 CO5 3 3 2.4 - 3 Material Introduction to Soft Computing: Overview of Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithms. Its representation. Unit - II Genetic Algorithm: Introduction to genetic algorithm, simple genetic algorithm, its representation. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover and its types: Flippingin, Interchanging, reversing, replacement, mutation for real-valu	CO5		3	1	1	3	3	-	-	-	-	-	3	3
CO-PSO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(i) COs PSO1 PSO2 PSO3 PSO4 PSO5 CO1 3 3 1 - 3 CO2 3 3 2 - 3 CO3 3 3 3 - 3 CO4 3 3 3 - 3 CO5 3 3 3 - 3 Average 3 3 2.4 - 3 Course Content MTech/CSE/PT/2/DSC2(i):Soft Computing Unit - 1 Introduction to Soft Computing: Overview of Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithm. Unit - II Genetic Algorithm: Introduction to genetic algorithm. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover and its types: Single point crossover, row corsover, for real-valued representation. Mutation and its types: Flipping, Interchanging, reversing, replacement, mutation for real- valued representation, crossover for real-valued representation of fuzzy set, basic properties of fuzzy sets. Fuzzy set operation: Intersection of fuzzy sets, inportant terminologies in	Average		2.4	1.8	1	2.6	1.8	-	-	-	-	-	2.4	3
COs PSO1 PSO2 PSO3 PSO4 PSO5 CO1 3 3 1 - 3 CO2 3 3 2 - 3 CO3 3 3 3 - 3 CO4 3 3 3 - 3 CO5 3 3 3 - 3 Average 3 3 2.4 - 3 CO5 3 3 2.4 - 3 Merage 3 3 2.4 - 3 Unit -1 Introduction to Soft Computing: Overview of Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithm. Unit -1 Genetic Algorithm: Introduction to genetic algorithm. Soft consover, more rossover, consover for real-valued representation. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover and its types: Single point crossover, two point consover, multipoint crossover, ordered crossover, crossover for real-valued representation.		CO-PSO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(i)												
CO1 3 3 1 - 3 CO2 3 3 2 - 3 CO3 3 3 3 - 3 CO4 3 3 3 - 3 CO5 3 3 3 - 3 Average 3 3 3 - 3 Merage 3 3 2.4 - 3 Merage 3 3 2.4 - 3 Merage 3 3 2.4 - 3 Unit - I Introduction to Soft Computing: Overview of Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithm. section: Unit - II Genetic Algorithm: Introduction to genetic algorithm, simple genetic algorithm, its representation. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover and its types: Single point crossover, two point crossover, multipoint crossover, ordered crossover, uniform crossover, crossover for real-valued representation. Mutation and tis types: Flipping, Interchanging, reversing replacement, mutation for fuzzy sets, important terminologits in fuz	COs	PSO1 PSO2 PSO3 PSO4 PSO3												
CO2 3 3 2 - 3 CO3 3 3 3 - 3 CO4 3 3 3 - 3 CO5 3 3 3 - 3 Average 3 3 2.4 - 3 Average 3 3 2.4 - 3 Course Content MTech/CSE/PT/2/DSC2(i):Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithms. Unit - II Genetic Algorithm: Introduction to genetic algorithm, simple genetic algorithm, its representation. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover and its types: Single point crossover, two point crossover, multipoint crossover, ordered crossover, uniform crossover, crossover for real-valued representation. Mutation and its types: Flipping, Interchanging, reversing, replacement, mutation for real- valued representation, crossover rate, mutation rate and convergence criteria. Unit - III Fuzzy Logic: Introduction to fuzzy sets, union of fuzzy sets, complement of fuzzy sets, important terminologies in fuzzy set, set, union of fuzzy sets, complement of fuzzy sets, important terminologies in fuzzy set, operations, properties of fuzzy sets, fuzzy arithmetic. Ivit - IV Artificial N	CO1	3 3 1 - 3												
CO3 3 3 3 - 3 CO4 3 3 3 - 3 CO5 3 3 3 - 3 Average 3 3 2.4 - 3 Average 3 3 2.4 - 3 Course Content MTech/CSE/PT/2/DSC2(i):Soft Computing Unit - I Introduction to Soft Computing: Overview of Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithms. Unit - II Genetic Algorithm: Introduction to genetic algorithm, simple genetic algorithm, its representation. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover, uniform crossover, rowordered crossover, nultipoint crossover, ordered crossover, nultiform crossover, rowordered crossover, uniform crossover for real-valued representation. Mutation and its types: Flipping, Interchanging, reversing, replacement, mutation for real- valued representation, crossover rate, mutation rate and convergence criteria. Unit - III Fuzzy set operation: Intersection of fuzzy sets, union of fuzzy sets, complement of fuzzy sets, important terminologies in fuzzy set, oproperties of fuzzy sets, trepresentation. <t< td=""><td>CO2</td><td colspan="13">3 3 2 - 3</td></t<>	CO2	3 3 2 - 3												
CO4 3 3 3 - 3 CO5 3 3 3 - 3 Average 3 3 2.4 - 3 Course Content MTech/CSE/PT/2/DSC2(i):Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithms. Unit - II Genetic Algorithm: Introduction to genetic algorithm, simple genetic algorithm, its representation. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover and its types: Single point crossover for real-valued representation. Mutation and its types: Flipping, Interchanging, reversing, replacement, mutation for real- valued representation, crossover rate, mutation rate and convergence criteria. Unit - III Fuzzy set operation: Intersection of fuzzy sets, important terminologies in fuzzy set, union of tazy sets, complement of fuzzy sets, important terminologies in fuzzy set, properties of fuzzy sets, fuzzy arithmetic. Fuzzy Composition: Max-Min composition, max-star composition, max-product composition, max-average composition. fuzzification and de-fuzzification. Unit - IV Artificial neural Network: Basic of neural network: neuron, artificial neuron, neural network, atrificial neural network, preceptron, feed forward, multilayer perceptron neural network, advantage and disadvantage of ANNs. Activation function and types of activation function. perceptron network, XOR problem.	CO3	3 3 - 3												
CO5 3 3 3 - 3 Average 3 3 2.4 - 3 Course Content MTech/CSE/PT/2/DSC2(i):Soft Computing Unit - I Introduction to Soft Computing: Overview of Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithm, simple genetic algorithm, its representation. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover and its types: Single point crossover, two point crossover, multipoint crossover, ordered crossover, uniform crossover, crossover for real-valued representation. Mutation and its types: Flipping, Interchanging, reversing, replacement, mutation for real- valued representation, crossover rate, mutation rate and convergence criteria. Unit - III Fuzzy Logic: Introduction to fuzzy logic, representation of a classical set, representation of fuzzy set, basic properties of fuzzy sets. Fuzzy set operation: Intersection of fuzzy sets, union of fuzzy sets, complement of fuzzy sets, important terminologies in fuzzy set operations, properties of fuzzy sets, fuzzy arithmetic. Fuzzy Composition: Max-Min composition, max-star composition, max-product composition, max-average composition. fuzzification and de-fuzzification. Unit - IV Artificial Neural Network: Basic of neural network: neuron, artificial neuron, neural network, advantage and disadvantage of ANNs. Activation function and types of activation function, perceptron network, XOR problem.	CO4	3 3 3 - 3												
Average 3 2.4 - 3 Course Content MTech/CSE/PT/2/DSC2(i):Soft Computing Unit - I Introduction to Soft Computing: Overview of Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithms. Unit - II Genetic Algorithm: Introduction to genetic algorithm, simple genetic algorithm, its representation. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover and its types: Single point crossover for real-valued representation. Mutation and its types: Flipping, Interchanging, reversing, replacement, mutation for real- valued representation, crossover rate, mutation rate and convergence criteria. Unit - III Fuzzy Logic: Introduction to fuzzy logic, representation of a classical set, representation of fuzzy set, basic properties of fuzzy sets. Fuzzy set operation: Intersection of fuzzy sets, union of fuzzy sets, complement of fuzzy sets, important terminologies in fuzzy set operations, properties of fuzzy sets, fuzzy arithmetic. Fuzzy Composition: Max-Min composition, max-star composition, max-product composition, max-average composition, fuzzification and de-fuzzification. Unit - IV Artificial Neural Network: Basic of neural network: neuron, artificial neuron, neural network, advantage and disadvantage of ANNs. Activation function and types of activation function, perceptron network, XOR problem.	CO5	3 3 3 - 3												3
Course Content MTech/CSE/PT/2/DSC2(i):Soft Computing Unit - I Introduction to Soft Computing: Overview of Soft Computing, difference between soft and hard computing, brief descriptions of different components of soft computing including artificial neural networks, fuzzy logic, genetic algorithms. Unit - II Genetic Algorithm: Introduction to genetic algorithm, simple genetic algorithm, its representation. Selection: Roulette wheel selection, random, rank, tournament, boltzmann selection. Crossover and its types: Single point crossover, two point crossover, multipoint crossover, ordered crossover, uniform crossover, crossover for real-valued representation. Mutation and its types: Flipping, Interchanging, reversing, replacement, mutation for real- valued representation, crossover rate, mutation rate and convergence criteria. Unit - III Fuzzy Logic: Introduction to fuzzy logic, representation of a classical set, representation of fuzzy set, basic properties of fuzzy sets. Fuzzy set operation: Intersection of fuzzy sets, union of fuzzy sets, complement of fuzzy sets, important terminologies in fuzzy set operations, properties of fuzzy sets, fuzzy arithmetic. Fuzzy Composition: Max-Min composition, max-star composition, max-product composition, max-average composition. fuzzification and de-fuzzification. Unit - IV Artificial Neural Network: Basic of neural network: neuron, artificial neuron, neural network, advantage and disadvantage of ANNs. Activation function and types of activation function. perceptron network, XOR problem.	Average	3 3 2.4 -											3	
Composition, max-average composition. fuzzification and de-fuzzification. Unit - IV Artificial Neural Network: Basic of neural network: neuron, artificial neuron, neural network, artificial neural network, perceptron, feed forward, multilayer perceptron neural network, advantage and disadvantage of ANNs. Activation function and types of activation function. perceptron network, XOR problem.	Unit - I Unit - II Unit - III	Intiha art Gee rep Se Cr ord Mu va Fu fuz Fu set ari Fu	roduction rd compu- ificial ne enetic Algoresentati lection: F ossover a dered cro utation an lued repre- zzy Logi zzy set, b zzy set, o s, import thmetic. zzy Com	MTec n to So tting, I ural ne gorithm on. Rouletta ind its ty esentat c: Intro asic pro- peratio ant term positio	h/CSE/ ft Comporief des tworks, n: Introc e wheel types: S , uniforn ypes: F ion, cro oduction operties n: Inter- minolog	PT/2/D outing: C scription fuzzy lo luction t selectio ingle po n crosso lipping, ssover r to fuzz of fuzz section o gies in fu	SC2(i):S Overview is of diff ogic, gen o genetic n, rando int cross over, cros	Soft Co v of Sc erent c etic al c algor m, ran sover, ssover nging, ation r represe sets, u operation, max	omput oft Con compor gorithi rithm, s k, tour two po for rea revers ate and entation nion o ions, pr	ing puting pents o ns. simple namen int cro il-value ing, re l conve n of a o f fuzzy roperti	g, differe f soft co genetic at, boltzr ssover, r ed repre placeme classical v sets, co es of fuz sition, m	algorith nann sel multipoi sentation ent, muta criteria. set, rep ompleme zzy sets, aax-prod	ween so g includi m, its ection. nt cross n. ation for resentation fuzzy uct	ft and ing over, real- ion of zzy
L'ANT/UNTANANA VAAIZA	Unit - IV	Fuzzy Composition: Max-Min composition, max-star composition, max-product composition, max-average composition. fuzzification and de-fuzzification.Unit - IVArtificial Neural Network: Basic of neural network: neuron, artificial neuron, neural network, artificial neural network, perceptron, feed forward, multilayer perceptron neural network, advantage and disadvantage of ANNs. Activation function and types of activation function. perceptron network, XOR problem.												





Text Books	 David E. Goldberg, Genetic Algorithms in Search, Optimization and Machine Learning, Addison Wesley. ZbigniewMichalewicz, Genetic Algorithms +Data Structures = Evolution Programs, SpringerVerlag.
Reference Books	 M. Mitchell, An Introduction to Genetic Algorithms, Prentice-Hall. S. Rajasekaran& G. A. VijayalakshmiPai, Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, PHI. S. N. Sivanandam& S. N. Deepa, Principles of Soft Computing, Wiley - India. Simon O. Haykin, Neural Networks, A Comprehensive Foundation, PHI.

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	MTech/CSE/PT/2/DSC2(ii): Machine Learning											
CourseCourseContactDeliveryMaximum MarksExamAsses												
Туре	Credit	Hours/ Week	Mode	External	Internal	Duration	Methods					
Optional Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/					
					20 5 5		Attendance					

Course Objectives: The objective of this course is to enable student to perform experiments in Machine Learning using real-world data.

Course Outcomes	At th	At the end of this course, the student will be able to :												
CO1	defin	e the t	erms of	f machi	ine lear	ning: d	ata-pre	process	ing, cl	assifica	tion, reg	ression		
	and r	neurons	•											
CO2	expla	in the	types of	f: data,	data pr	e proce	ssing re	egression	n, class	ificatio	n ,unsup	ervised		
	learn	arning. iscuss: architecture of ANN												
<u> </u>	annl	iss: arci	ing on	e of Ar	NIN.	maina	data			and n	andal as	laction		
005	appr	pply: training and testing data using data pre processing and model selection												
	proh	econfigues and classification, regression, clustering techniques according to their problem.												
CO4	class	assify techniques of data pre processing model selection regression classification												
	and u	nd unsupervised learning techniques.												
CO5	comp	pare tec	hnique	s of: da	ta pre p	rocessi	ng, supe	ervised a	and uns	upervis	ed learni	ng.		
CO)-PEO	EO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(ii)												
COs	Pl	EO1		PEO2	2	F	PEO3		PEO4		PEC	05		
CO1		1		1			3		3		3			
CO2		2		2			3				3			
CO3		3		3			3		3		3			
CO4		3		3			3		3		3			
CO5		3		3			3		3		3			
Average	2	2.4		2.4			3		3		3			
С	O-PO	Mappi	ng Mat	rix for	Course	e MTeo	h/CSE	/PT/2/D	SC2(ii)				
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1	1	3	1	1	1	-	-	-	-	-	1	3		
CO2	2	1	1	3	1	-	-	-	-	-	2	3		



CO3		3	1	1	3	3	-	-	-	-	-	3	3
CO4		3	3	1	3	1	-	-	-	-	-	3	3
CO5		3	1	1	3	3	-	-	-	-	-	3	3
Average		2.4	1.8	1	2.6	1.8	-	-	-	-	-	2.4	3
CO-PSO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(ii)													
COs	PSO1		01	PSO2			PS	03		PSO4		PSO5	
CO1		3		3			1			-		3	
CO2		3		3			2			-		3	
CO3		3		3			3			-		3	
CO4	3		3	3			3			-		3	
CO5		(°)	3	3			3			-		3	
Average		(°,	3		3		2.4			-		3	
Course Content MTech/CSE/PT/2/DSC2(ii): Machine Learning													
Unit – I Basics of Machine Learning; Introduction to Artificial Intelligence and Machine Learning, Types of Machine Learning and its comparisons, Applications of Machine Learning, Issues in Machine Learning.													
Unit – IIPreparing to Model: Introduction, Machine Learning Activities, Types of Data in Machine Learning, Exploring structure of data, Data Pre-processing(Dimension Reduction and Feature subset selection), Model Selection.													
Unit – III	Supervised Learning: Introduction, Classification (Introduction, classification model, learning steps, Common classification algorithm), Regression (Linear Regression, Multivariable Regression, Logistic Regression).												
Unit – IV Unsupervised Learning: Introduction and its applications, Techniques in Unsupervised Learning (Clustering, K-Means). Neural Network: Introduction, Architecture of Artificial Neural Network.													
]	fext/Re	eferenc	e Book	S					
 Text Books Tom M. Mitchell, Machine Learning, McGraw-Hill Education (India) Private Limited. EthemAlpaydin, Introduction to Machine Learning - Adaptive Computation and Machine Learning, The MIT Press. 													
Reference Book 1. Stephen Marsland, Machine Learning: An Algorithmic Perspective, CRC Press. 2. Peter Flach, Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press. 3. Peter Harrington, Machine Learning in Action, Manning 4. ShaiShalevShwartz and Shai Ben David, Understanding Machine Learning From Theory to Algorithms, Cambridge University Press													





MTech/CSE/PT/2/DSC2(iii):Artificial Intelligence												
Course	Course	Contact	Delivery	Maximu	um Marks	Exam	Assessment					
Туре	Type Credit Hour Wee		Mode	External	Internal	Duration	Methods					
Optional Theory	04	04	Lecture	70	30 20 5 5	3 Hours	TEE/MTE/ Assignment/ Attendance					

Course Objectives: Aim of this course is to familiarize the students with various techniques of artificial intelligence like predicate calculus, production rules; expert systems.

Course Outcomes	At the end of this course, the student will be able to :												
CO1	defin know	e: artif ledge	icial int represer	elliger ntation	nce terma , learnin	s, type ig tech	es of sea iniques a	rch strat	egy, pro	oduction orithm ter	system, minolog	ies.	
CO2	explain: the types and properties of search algorithm, predicate calculus, knowledge representation and explore the theories that demonstrate intelligent behavior including intelligent editor, learning by induction and dealing with uncertainty.												
CO3	use: search strategy, genetic algorithm, fuzzy logic and learning technique.												
CO4	classify types of: search strategy, production system, learning, operator of genetic algorithm, knowledge representation and approaches that deals with uncertainty.												
CO5	compare and select types of: search strategy, production system, learning, operator of genetic algorithm, knowledge representation and approaches that deals with uncertainty.												
CO-PEO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(iii)													
Cos	PE	201	PEO2				PEO3		PEO4		PEO5		
CO1		1	1				3		3		3		
CO2		2	2				3		3		3		
CO3	3				3			3		3			
CO4		3	3				3		3		3		
CO5	3 3					3			3		3		
Average	2	2.4 2.4					3			3		3	
CO-PO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(iii)													
COs	PO1	P02	PO3	P04	PO5	PO6	PO7	PO8	P09	P010	P011	P012	
CO1	1	3	1	1 1 1		-	-	-	-	-	1	3	



CO2	2	1	1	3	1	-	-	-	-	-	2	3
CO3	3	1	1	3	3	-	-	-	-	-	3	3
CO4	3	3	1	3	1	-	-	-	-	-	3	3
CO5	3	1	1	3	3	-	-	-	-	-	3	3
Average	2.4	1.8	1	2.6	1.8	-	-	-	-	-	2.4	3
CO-PSO Mapping Matrix for Course MTech/CSE/PT/2/DSC2(iii)												
COs	PS	D1	F	PSO2		P	SO3		PSO4		PSC)5
CO1	3	3 3					1		-	ĺ	3	
CO2	3	;		3		2			-		3	
CO3	3	3				3			-	ĺ	3	
CO4	3	;	3			3			-	ĺ	3	
CO5	3	;		3		3			-		3	
Average	3	;		3		2.4			-		3	
	•	•			•			•		•		
Course Content MTech/CSE/PT/2/DSC2(iii):Artificial Intelligence Unit – I Introduction: Background and history, Overview of AI applications areas. The predicate calculus: Syntax and semantic for propositional logic and FOPL, Clausal form, inference rules, resolution and unification. Knowledge representation: Network representation-Associative network & conceptual												
Unit – II Search strategies: Strategies for state space search-data driven and goal driven search; Search algorithms- uninformed search (depth first, breadth first, depth first with iterative deepening) and informed search (Hill climbing, best first, A* algorithm, mini-max etc.), computational complexity, Properties of search algorithms - Admissibility, Monotonicity, Optimality, Dominance.												
Unit – IIIProduction system: Types of production system-commutative and non-commutative production systems, Decomposable and non-decomposable production systems, Control of search in production systems. Rule based expert systems: Architecture, development, managing uncertainty in expert systems - Bayesian probability theory, Stanford certainty factor algebra, Nonmonotonic logic and reasoning with beliefs, Fuzzy logic, Dempster/Shaffer and other approaches to uncertainty												
Unit – IV	Knowledge acquisition: Types of learning, learning by automata, intelligent editors, learning by induction. Genetic algorithms: Problem representation, Encoding Schemes, Operators: Selection, Crossover, Mutation, Replacement etc.											
]	Fext/R	eferenc	e Bool	ks					
Text Books	1. G B	eorge enjam	F. I in/Cum	Luger, mings	Willia Publishi	im A ing Co	. Stub mpany,	blefield, Inc.	Artif	ïcial Iı	ntelligenc	e, The
\$	Su PuBorbar Totan											




	2. 3. 4.	Dan W. Patterson, Introduction to Artificial Intelligence and Expert system, PHI. Wills J. Nilsson, Principles of Artificial Intelligence, Narosa Publishing House. Jackson Peter, Introduction to Expert Sytems, 3e, Addison Wesley -2000.
Reference Books	1. 2.	Ben Coppin, Artificial Intelligence Illuminated, Narosa Publishing House. Eugene Charniak, Drew McDermott, Introduction to Artificial Intelligence, Pearson Education.

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MTech/CSE/I	MTech/CSE/PT/2/CC6: Software Lab based on MTech/CSE/PT/2/CC4 (Advanced Web Technology)											
Course Type	e Type Course C		Delivery	Maxim	um Marks	Exam	Assessment					
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods					
Practical	02	04	Lab Work	50	-	3 Hours	TEE/					
							Practical File					

Instructions to paper setter for Final Term Examination: The Final Term examination will be conducted by a panel of internal and external examiners. Examinees will be evaluated on the bases of practical file, performance in practical and a viva voce exam.

Course Objectives: The objective of this course is to get the students hands on practice with programming constructs of HTML, Java Scripts, Search Engines and CMS.

Course Outcome	s At the	end of th	nis cours	e, the stu	dent wil	l be able	e to:					
CO-1	define MySO	the bas	ic conce	epts of H	TML, C	CSS, XH	HTML,	HTM	L5, XN	IL, Java	aScript,	PHP,
<u> </u>	descril	L, Search	I comm	on tage	HTMI 5	agemen Canabil	lities ar	ns. nd use i	of XM	[]ava	Script c	oncent
0-2	with P	HP & M		earch en	rine tech	niques	and on	imize (search	∟, Java∟ results	sempt et	леері
CO-3	perfor	$\frac{111}{100} \times HTM$	I tage y	with XN	I Iava	Script v	with PL	IP and	MvS	DI que	ies on	timize
0-5	search	search engine result using SEO techniques. Webhosting and different type of CMS										
	techno	logies	iesuit u	Sing 5L		ilques,	W COHO	sung a	ina an	iciciit t	ype or	CIVID
<u> </u>	illustra	illustrate: relationship of HTML with XML, building query on tables and forms, improve										
	rankin	ranking using search engine optimization techniques, analyze different CMS like										
	Wordr	Wordpress, Joomla and Drupal with help of their features.										
CO-5	compa	compare: HTML with HTML5, relationship of HTML, SGML and XML.										
	determ	determine: client side or server side JavaScript.										
	evalua	evaluate: queries on table and forms using MySQL.										
	choose	choose: effective plan to achieve higher ranking in search results.										
CO-6	design	design: webpages using HTML, CSS, XML and JavaScript, generate various query using										
	MySQ	MySQL in webpages, modify webpages to achieve higher ranking in search engine.										
	create:	create: blog or websites using Content Management System.										
	CO-PEO Mapping Matrix for Course MTech/CSE/PT/2/CC6											
Cos	PEO	1	PE	02]	PEO3		PE	204		PEO	5
CO1	1			1		3		,	3		3	
CO2	2			2 3 3			3		3			
CO3	3			3		3			3		3	
CO4	3			3		3		, -	3		3	
CO5	3			3		3			3		3	
CO6	3			3		3		ź	3		3	
Average	2.5		2	.5		3		,	3		3	
	CO-	PO Map	ping Ma	atrix for	Course	MTech	/CSE/I	PT/2/C	C6			
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12



CO1	1	3	1	1	1	-	-	-	-	-	1	3
CO2	2	1	1	3	1	-	-	-	-	-	2	3
CO3	3	1	1	3	3	-	-	-	-	-	3	3
CO4	3	3	1	3	1	-	-	-	-	-	3	3
CO5	3	1	1	3	3	-	-	-	-	-	3	3
CO6	3	3	3	3	3	-	-	-	-	-	3	3
Average	2.5	2	1.33	2.66	2	-	-	-	-	-	2.5	3
CO-PSO Mapping Matrix for Course MTech/CSE/PT/2/CC6												
COs	PS	PSO1 PSO2 PSO3 PSO4 PSO5										5
CO1		3		3		1		-			3	
CO2		3		3		2			-		3	
CO3		3		3		3			-		3	
CO4		3		3		3			-		3	
CO5		3 3							-		3	
CO6		3		3		3			-		3	
•		-		•		2.5		-			2	

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	MTech/CSE/PT/3/CC7: MATLAB Programming											
Course Type	Course	Contact	Delivery	Maximu	m Marks	Exam	Assessment					
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods					
Compulsory Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/					
					20 5 5		Attendance					

Course Objectives: The objective of this course is to study, learn, and understand the major concepts of MATLAB Programming, namely, data types, data structure, matrices, data import/export, graphics, control structure, toolboxes, image and video processing.

Course Outcomes	At the end of	his course, the student	will be able to:								
CO1	define: feature	es, commands, data typ	bes, hierarchy of op	perations, matrix	, tools, functions						
	related to inpu	it/output, file handling	and graphics, con	trol structure and	d toolboxes used						
	in MATLAB.										
CO2	describe: hist	ory, origin, features,	commands, data	types, hierarch	y of operations,						
	matrix, tools,	functions related to file	e, function related	to graphics, con	rol structure and						
<u> </u>		exes of MATLAB.	anus toolhons inn	ut/autout functio	na filo hondling						
005	functions rel	use: commands, operations, tools, menus, toolbars, input/output functions, file handling, functions, related to graphics. 2D and 2D plotting control structure debugging									
	simulink and image & video processing toolboxes in MATLAB.										
CO4	analyze: commands, data types, operations, control structure, matrix, tools, different										
	functions related to graphics and file handling in given MATLAB program.										
CO5	determine: command, data type, tool, menu, control structure, debugging technique,										
	function, featu	function, feature or toolbox of MATLAB to use in given condition.									
CO6	create: basic or advanced program in MATLAB using different commands, 2D and 3D										
	plotting, functions, tools, features, simulink, fuzzy logic, neural network and image &										
	video processi	video processing toolbox of MATLAB.									
	CO-PEO Ma	pping Matrix for Cou	urse MTech/CSE/	PT/3/CC7							
COs	PEO1	PEO2	PEO3	PEO4	PEO5						
CO1	1	1	3	3	3						
CO2	2	2	3	3	3						
CO3	3	3	3	3	3						
CO4	3	3	3	3	3						
CO5	3	3	3	3	3						
CO6	3	3 3 3 3 3									
Average	2.5	2.5	3	3	3						





COs PC CO1 1 CO2 2 CO3 3 CO4 3 CO5 3 CO6 3 Average 2 COs CO CO3 CO CO6 CO CO3 CO CO3 CO CO3 CO CO3 CO	PO1 1 2 3 3 3 3 2.5 CO-P	PO2 3 1 1 3 1 3 2 SO Ma SO1 3 3 3	PO3 1 1 1 1 1 1 1 1 1 1 1 3 1.33 pping N	PO4 1 3 3 3 2.67 Matrix f PSO2	PO5 1 1 3 1 3 2 for Cou	PO6	PO7 - - - - - - - - - -	PO8 - - - - - - -	PO9	PO10	PO11 1 2 3 3 3 3 2 5	PO12 3 3 3 3 3 3 3		
CO1 1 CO2 2 CO3 3 CO4 3 CO5 3 CO6 3 Average 2 COs CO1 CO2 CO3	1 2 3 3 3 2.5 CO-P	3 1 1 3 1 3 2 SO Ma 3 3	1 1 1 1 3 1.33 pping N	1 3 3 3 2.67 Matrix f PSO2	1 1 3 1 3 2 for Cou	- - - - - - rse MT	- - - - - - -		- - - - - - -	- - - - - -	1 2 3 3 3 3 2 5	3 3 3 3 3 3		
CO2 2 CO3 3 CO4 3 CO5 3 CO6 3 Average 2 COs CO CO1 CO2 CO3 CO3	2 3 3 3 2.5 C O-P	1 1 3 1 3 2 SO Ma SO1 3 3	1 1 1 3 1.33 pping N	3 3 3 2.67 Matrix f PSO2	1 3 1 3 2 for Cou	- - - - - rse MT	- - - - - -	- - - - - -	- - - - -	- - - - - -	2 3 3 3 3 2 5	3 3 3 3 3		
CO3 3 CO4 3 CO5 3 CO6 3 Average 2 COs CO CO1 CO2 CO3 CO3	3 3 3 2.5 C O-P	1 3 1 3 2 SO Ma 3 3	1 1 3 1.33 pping N	3 3 3 2.67 Matrix f PSO2	3 1 3 3 2 for Cou	- - - - rse MT	- - - - -		- - - - -	- - - -	3 3 3 3 25	3 3 3 3		
CO43CO53CO63Average2COsCOCO1CO2CO3CO3	3 3 2.5 CO-P	3 1 3 2 SO Ma 3 3	1 1 3 1.33 pping N	3 3 2.67 Matrix f PSO2	1 3 2 for Cou	- - - - rse MT	- - - èech/C		- - -	- - -	3 3 3	3 3 3		
CO53CO63Average2COsCCO1CO2CO3C	3 3 2.5 C O-P	1 3 2 SO Ma SO1 3 3	1 3 1.33 pping N	3 3 2.67 Matrix f PSO2	3 3 2 for Cou	- - - rse MT	- - - èech/C	-	- - -	- -	3 3	3		
CO63Average2.COsCoCO1CO2CO3CO3	3 2.5 C O-P	3 2 SO Ma SO1 3 3	3 1.33 pping N	3 2.67 Matrix f PSO2	3 2 for Cou	- - rse MT	- - ech/C	-		-	3	3		
Average2COsCO1CO2CO3	2.5 C O-P	2 SO Ma SO1 3 3	1.33 pping N	2.67 Matrix f PSO2	2 for Cou	- rse MT	- ech/C	-	-	-	25	•		
COs CO1 CO2 CO3	С О-Р Р	SO Ma SO1 3 3	pping N	Matrix f PSO2	or Cou	rse MT	ech/C				2.5	3		
COs CO1 CO2 CO3	P	SO1 3 3		PSO2										
CO1 CO2 CO3		3 3			COsPSO1PSO2PSO3PSO4PSO5									
CO2 CO3		3		3			1		-		3			
CO3				3			2		-		3			
		3		3			3		- 3					
CO4		3		3			3		- 3					
CO5		3		3			3				3			
CO6		3		3			3		-		3			
Average		3	3 2.5 - 3											
Course Content MTech/CSE/PT/3/CC7: MATLAB Programming														
Unit I MA tool dire con and Vec mat mat	ATL2 olbar, rector nstant d assi ectors atrices atrices	AB: Intr comput y and s ts, varia gnment and m s subscr s, comm	oductio ting, typ aving f bles an statemo atrices: ripts, m aands re	n, histor bes of fil files, con d expresents. scalars ulti-dim lated to	ey, origi e, edito nstants ssions, o and ve ensiona matrice	n, grow or debug variable operator ectors, e il matric	th and ger, us es and s, hier enterin ces and ture ar	develo seful co expre rarchy g data d array rays, co	opment, i ommand ssions-cl of opera in matr s, matrix ell arrays	teatures s, help s haracter tions, b ices, lir s manig	, menus system, set, da uilt-in-f ne conti- pulation,	and the creating ta type, unction, nuation, special		
Unit - IIPolynomials: entering, evaluation, roots, operations. Input/output statements: data input, interactive inputs, reading/storing data files, output commands, low level input output functions. Introduction to data import and export, supported file format, working with audio/video file, importing audio/video data, reading audio/video data from a file, exporting audio/video data, example, working with spreadsheets, writing to an xls file, reading from an xls files, working with graphics file, importing graphics data, exporting graphics data, creating a simple GUI programmatically, dissertations of different components in guide, creating menus.														
Unit - III MATLAB graphics: 2d/3d plotting visualization, 2d plot , multiple plot, style options,														





	legends, subplots, specialized 2d plot- logarithmic, polar, area, bar, barh, hist, rose, pie, stairs, stem, compass. 3d plot - plot3, bar3, bar3h, pie3, stem 3, meshgrid, mesh, surf, contour, contour3. Control Structures: for, nested for, while, branch control structure- if, switch, break, continue, error, try-catch, debugging.							
Unit - IV	Introduction to MATLAB toolboxes: Simulink, image & video processing toolbox, application level image processing techniques, mri image processing, fuzzy logic toolbox, neural network toolbox.							
Text/Reference Books								
Text Books.	 Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar, MATLAB and its Application in Engineering, Pearson Education. Ram N.Patel, Ankush Mittal, Programming in MATLAB, A Problrm Solving Approach, Pearson Education. Duane Hanselman, Bruce L Littlefield, Mastering MATLAB 7, Prentice Hall. Amos Gilat, MATLAB: An Introduction with Application, Wiley Publisher. 							
Reference Books	 Jim Sizemore, John P.Mueller, MATLAB for Dummies, Wiley. Stephen J.Chapman, Matlab Programming for Engineers, Thomson-Engineering Publisher, CENGAGE Learning. 							





	MTech/CSE/PT/3/CC8: Advanced Operating System											
Course Type	Course	Contact	Exam	Assessment								
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods					
Compulsory Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/					
					20 5 5		Attendance					

Course Objectives: The objective of this course is to study, learn, and understand the major concepts of advanced operating systems, namely, multimedia operating systems, distributed and real time operating systems, threads, security and design issues in operating systems.

Course Outcomes	At the	end of	this cou	rse, the	student	will abl	le to:					
CO1	define	: kerne	l, threa	ds, con	cept of	multin	nedia,	distribu	ited and	d real	time op	erating
	systen	n, issues	in desi	gn, secu	rity and	perform	nance	of oper	ating sy	stem.		
CO2	unders	stand a	nd des	cribe:	kernel,	threads	s, dea	dlock,	virtua	alizatio	n, conc	ept of
	multir	nedia, d	listribute	$\frac{1}{2}$ and $\frac{1}{2}$	real tim	e opera	ting s	ystem, 1	ssues 11	n desigi	n, securi	ity and
	perfor	mance (of operation	ting sys	tem.		iale a al				duling	
005	demoi	nstrate/1	inustrate	: proces	s sched	and pr	ISK SCI	n mooh	, real th	me sche	ting over	om
<u> </u>	classif	classify algorithm for process scheduling and disk scheduling mutual exclusion										
04	deadlo	deadlock, security and protection.										
CO5	compa	compare algorithm for: process scheduling and disk scheduling, mutual exclusion,										
	deadlo	ock, seci	urity and	d protec	tion.		0			6,		
	CO-P	PEO Ma	pping I	Matrix	for Cou	rse MT	Tech/C	SE/PT/	/3/CC8			
COs	PF	PEO1 PEO2 PEO3 PEO4 PEO5)5		
CO1		1	 	1	l		2		2		2	
01	· · · · ·	1		1			5		5		5	
CO2		2		2			3		3		3	
CO3	-	3		3			3		3		3	
CO4		3		3			3		3		3	
CO5	-	3		3			3		3		3	
Average	2	.4		2.4			3		3		3	
	CO-]	PO Maj	pping M	latrix f	or Cou	se MT	ech/CS	SE/PT/3	3/CC8			
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	1	1	1	-	-	-	-	1	3
CO2	2	1	1	3	1	1	-	-	-	-	2	3
CO3	3	1	1	3	3	1	-	-	-	-	3	3



					i	1							
CO4	3	3	1	3	1	1	-	-	-	-	3	3	
CO5	3	1	1	3	3	1	-	-	-	-	3	3	
Average	2.4	1.8	1	2.6	1.8	1	-	-	-	-	2.4	3	
	CO-I	PSO Ma	pping	Matrix	for Cou	irse M'	Fech/C	CSE/PT	/3/CC8				
COs	F	PSO1		PSO2	2	Р	SO3		PSO4		PSC	D5	
CO1		3		2			1		-		3		
CO2	3 2 2 - 3									3			
CO3		3		2			3		-		3		
CO4		3		2			3		-		3		
CO5		3		2			3		-		3		
Average		3		2			2.4		-		3		
Course Content MTech/CSE/PT/3/CC8: Advanced Operating System													
compression standards; process scheduling, file system, file placement, caching and disk scheduling for multimedia.													
Unit - II	Distributed operating systems: Multiprocessor hardware and scheduling; multicomputer hardware and scheduling; distributed computing architecture; distributed system models; distributed shared memory and distributed file system; mutual exclusion and deadlocks in distributed systems; network operating system vs. distributed operating system												
Unit - III	Real-tin schedul kernel;	ne oper ling in r virtualiz	rating eal-tim zation;	systems: e operat threads -	Chara ing syst - conce	cteristic ems; tr pt, adva	es and ends in ntages	l classi n kerne , imple	fication l design, mentatic	of re , exo-l on.	al-time kernel and	systems; d micro-	
Unit - IV	Design princip system inside a	issues les and perform and outsi	in op paradi mance ide atta	erating gms of of opera cks, prot	systems interfa ating sy tection	s: Goal ce desi stem; s mechan	s and gn; is ecurity ism.	nature sues in y – cry	e of des impler ptograph	sign p nentat ny, use	oroblem; ion of o er authen	guiding perating atication,	
				Text/Re	eferenc	e Books	8						
Text Books.	 Andrew S. Tanenbaum, Modern Operating Systems, 2e, Pearson – Prentice Hall. Pramod Chandra P. Bhatt, An Introduction to Operating Systems – Concepts and Practice, 3e, Prentice Hall, India. Charles Crowley, Operating Systems – A Design Oriented Approach, Tata McGraw Hill. 												
Reference Books	 Deitel H.M., Operating Systems, Pearson Education. Stallings William, Operating System, PHI Learning. Godbole A.S., Operating Systems, Tata McGraw-Hill, New Delhi. TanenbaumA.S., Operating System- Design and Implementation, PHI Learning. 												





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	M.Tech/CSE/PT/3/DSC3(i): IoT and Cloud Computing											
Course Type	Course	Contact	Delivery	Maximu	m Marks	Exam	Assessment					
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods					
Optional Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/					
					20 5 5		Attendance					

Course Objectives: To study the fundamental concepts of cloud computing, its enabling technologies, cloud service modes and security concerns, to learn core issues of Internet of Things, IoT communication protocols and security concerns.

Course Outcomes	By the end of	By the end of this course, the student will be able to:										
CO1	list/define IoT: framework, architecture, design, communication challenges, applications, principles of web connectivity. list/define cloud computing: evolution, characteristics, working, service models, virtualization, architecture, security challenges and risks.											
CO2	understand a challenges, ap understand an models, virtua	understand and describe IoT: framework, architecture, design, communication challenges, applications, principles of web connectivity. understand and describe cloud computing: evolution, characteristics, working, service models virtualization architecture security challenges and risks										
CO3	use cloud com	puting services in	different fields of a	pplications.								
CO4	diagrammatise diagrammatise	e IOT: framework, e cloud computing:	architecture, physic service models, se	cal and logical orvice-oriented a	design. architec	ture.						
CO5	grade/compare application are grade/compare	grade/compare IoT: communication challenges, security issues, enabling technologies, application areas, and protocols. grade/compare cloud computing: service models. virtualization, and hypervisors.										
	CO-PEO Mapj	bing Matrix for C	ourse M. Iech/CSI	L/P1/3/D5C3(1)							
Cos	PEO1	PEO2	PEO3	PEO4		PEC)5					
CO1	1	1	3	3		3						
CO2	2	2	3	3		3						
CO3	3	3	3	3		3						
CO4	3	3	3	3		3						
CO 5	3	3	3	3		3						
Average	2.4	2.4	3	3		3						
CO-PO Mapping Matrix for Course M.Tech/CSE/PT/3/DSC3(i)												
Cos	PO1 PO2	PO3 PO4 P	O5 PO6 PO7	PO8 PO9	PO10	PO11	PO12					





	Ì	1		1	1	1	1	1	1	1	1		
CO.1	1	3	1	1	1	-	-	-	-	-	1	3	
CO.2	2	1	1	3	1	-	-	-	-	-	2	3	
CO.3	3	1	1	3	3	-	-	-	-	-	3	3	
CO.4	3	3	1	3	1	-	-	-	-	-	3	3	
CO.5	3	1	1	3	3	-	-	-	-	-	3	3	
Average	2.4	1.8	1	2.6	1.8	-	-	-	-	-	2.4	3	
CO-PSO Mapping Matrix for Course M.Tech/CSE/PT/3/DSC3(i)													
Cos	P	PSO1		PSO2	2	P	SO3		PSO4	-	PSC)5	
CO1		3		2			1		-		3		
CO2		3		2			2		-		3		
CO3		3		2			3		-		3		
CO4		3		2			3		-		3		
CO5		3		2			3		-		3		
Average		3		2			2.4		-		3		
	Μ	[Tech/C	SE/PT/	3/DSC3	8(i): Io7	f and C	loud (Comput	ting				
Unit - II	 IoT Architectural view, Technology Behind IoT, Sources of IoT, Examples of IoT, M2M Communication, Layered Architecture (3 & 5 Layered) of IoT, Physical Design and Logical Design, Domain-specific IoTs, Security Issues of IoT. Communication challenges related to IoT, Enabling technologies for IoT. Applications of IoT: Home Automation, Smart Cities, Social Life and Entertainment, Health & Fitness, Smart Environment and Agriculture, Supply Chain and Logistics, Energy conservation. Design principles for web connectivity: Web Communication protocols for Connected 												
Unit - III Unit - IV	Introduction to Cloud Computing: What is a cloud, definition of cloud computing, Evolution of cloud computing, characteristics of cloud computing, How Cloud Computing Works, Role of networks in Cloud computing. Service Models: IaaS, PaaS, SaaS, Public, private and hybrid cloud. Introduction to virtualization, Resource Virtualization-Server, Storage, Network, Load Balancing and Virtualization. Hypervisors and its types, Service Oriented Architecture (SOA), Overview of Security												
			or und	Tovt/De	forence								
Text/Reference Books Text Books 1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Cloud Computing a Practical Approach, Tata McGraw Hill, New Delhi, 2010 2. Robert Elsenpeter, Toby J. Velte, Anthony T. Velte, Cloud Computing: A Practical Approach, 1e, Tata McGraw Hill Education, 2011. 3. Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, Cloud Computing for									Practical Practical ting for				





	Dummies, Wiley Publishing, 2010
Reference Books	 RajkumarBuyya, James Broberg, AndrzejGoscinski, Cloud Computing- Principles and Paradigms, Wiley, 2011. Raj Kamal, Internet of Things-Architectures and Design Principles, McGraw Hill Education, 2017

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MTech/CSE/PT/3/DSC3(ii): Grid Computing

Course Type	Course	Contact	Delivery	Maximu	m Marks	Exam	Assessment	
	Credit	Hours/Week	Mode External		Internal	Duration	Methods	
Optional Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/	
					20 5 5		Attendance	

Instructions to paper setter for Final Term Examination: The question paper will consist of nine questions in all. First question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition, eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions of 15 marks each selecting at least one question from each unit.

Course Objectives The objective of this course is to study, learn, and understand the concepts of grid computing.

Course Outcomes	By the end of	By the end of this course, the student will be able to:												
CO1	define:cluster computing ,grid computing, meta computing, SOAP, WSDL, e- governance, OGSA, WSRF, GT4,cluster middleware, protocols for clusters, HiPPI, process scheduling.													
CO2	understand an WSDL, e-gov HiPPI, proces	understand and describe: cluster computing ,grid computing, meta computing, SOAP, WSDL, e-governance, OGSA, WSRF, GT4,cluster middleware, protocols for clusters, HiPPI, process scheduling												
CO3	Illustrate/dem web services,	Illustrate/demonstrate: concepts of networking, protocols, load balancing and sharing, web services, globustoolkit, setting up and administration of cluster.												
CO4	diagrammatize OGSA-DAI, c categorize: devices,sched	diagrammatize the architecture of: grid Computing ,service oriented architecture,GT4, OGSA-DAI, cluster categorize: clusters, protocols for clusters, networking and switching devices schedulingpolicies strategies for load balancing												
CO5	compare and load balancing	evaluate : clusters, pro g	ptocols for clusters	s,schedulingpolic	ies,strategies for									
(CO-PEO Mapp	oing Matrix for Cours	e M.Tech/CSE/P	Г/ 3/DSC3 (ii)										
Cos	PEO1	PEO2	PEO3	PEO4	PEO5									
CO1	1	1	3	3	3									
CO2	2	2	3	3	3									
CO3	3	3	3	3	3									
CO4	3	3	3	3	3									
CO5	3	3	3	3	3									
Average	2.4	2.4	3	3	3									
	CO-PO Mappi	ing Matrix for Course	e M.Tech/CSE/PT	CO-PO Mapping Matrix for Course M.Tech/CSE/PT/3/DSC3(ii)										



Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	3	1	1	1	-	-	-	-	-	1	3
CO.2	2	1	1	3	1	-	-	-	-	-	2	3
CO.3	3	1	1	3	3	-	-	-	-	-	3	3
CO.4	3	3	1	3	1	-	-	-	-	-	3	3
CO.5	3	1	1	3	3	-	-	-	-	-	3	3
Average	2.4	1.8	1	2.6	1.8	-	-	-	-	-	2.4	3
CO-PSO Mapping Matrix for Course M.Tech/CSE/PT/3/DSC3(ii)												
COs	P	SO1		PSO2	2	P	SO3		PSO4	L I	PSC)5
CO1		3		2			1		-		3	
CO2		3		2			2		-		3	
CO3		3		2			3		-		3	
CO4		3		2			3		-		3	
CO5		3		2			3		-		3	
Average		3		2		,	2.4		-		3	
Unit - I Unit - II	M.Tech/CSE/PT/3/DSC3(ii): Grid Computing nit - I Introduction: Cluster and Grid computing, Meta-computing, Web services and Grid Computing, e-Governance and the Grid Technologies and Architectures for Grid Computing: Issues in Data Grids, Functional requirements in Grid Computing, Standards for Grid Computing, Recent technologies trends in Large Data Grids. Web Services and the Service Oriented Architecture: Service Oriented Architecture, SOAP and WSDL, Creating Web Services, Server Side. nit - II OGSA and WSRF: OGSA for Resource Distribution, Stateful Web Services in OGSA, WSRF, WSRF Specification Globus Toolkit: History, version, Applications, Approaches and Benefits, Infrastructure											
Unit - III	 GT4 Architecture, GT4 Containers. The Grid and Databases: Requirements, Storage Request Broker, Integration of Databases with the Grid, Architecture of OGSA-DAI for offering Grid Database services. Cluster Computing: Approaches to Parallel Computing, Definition and Architecture of a Cluster, Categories of clusters. Cluster Middleware: Levels and Layers of Single System Image, Design objectives, Resource Management and Scheduling, Cluster programming Environment and Tools. Networking, Protocols and I/O for clusters: Networking and Interconnection/Switching Devices, Design Issues, Design Architecture, HiPPI, ATM, Myrinet, Memory Channel 											
Unit - IV	Setting Up and Administering a Cluster: Setup of simple cluster, setting up nodes, clusters of clusters, System monitoring, Global Clocks Sync.											



	 Cluster Technology for High Availability: High availability clusters, high availability parallel computing, types of failures and errors, cluster architectures and configurations for high availability, Failure/Recovery clusters. Process Scheduling: Job management System, Resource management system, policies of resource utilization, Scheduling policies. Load Sharing and Load Balancing: Introduction, Strategies for load balancing, Modelling parameters
	Text/Reference Books
Text Books	 Grid and Cluster Computing by C.S.R. Prabhu, PHI The Grid: Blueprint for a New Computing Infrastructure, Ian Foster, Carl Kesselman, Elsevier Series, 2004. Grid Computing for Developers, Vladimir Silva, Charles River Media, January 2006.
Reference Books	 Global Grids and Software Toolkits: A Study of Four Grid Middleware Technologies, High Performance Computing: Paradigm and Infrastructure, Laurence Yang and MinyiGuo (editors), Wiley Press, New Jersey, USA, June 2005. Grid Resource Management: State of the Art and Future Trends, JarekNabrzyski, Jennifer M. Schopf, Jan Weglarz, International Series in Operations Research & Management Science, Springer; 1e, 2003.

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M.Tech/CSE/PT/3/DSC3(iii): Quantum Computing												
Course Type	pe Course Contact Delivery Maximum Marks Exar						Assessment					
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods					
Optional Theory	04	04	Lecture	70	30 20 5 5	3 Hours	TEE/MTE/ Assignment/ Attendance					

Course Objectives: The objective of this course to understand the basic concept of quantum computing it's relation to mathematics and physics, quantum circuits, quantum information and cryptography, quantum algorithms.

Course Outcomes	By the	By the end of this course, the student will be able to:										
CO1	define and pi	define quantum computation:mechanics, circuit, multiple ,teleportation, cryptography and programming languages										
CO2	under	inderstand and describe quantum computation: mechanics, circuit, multiple,										
	telepo	rtation,	quantur	n algori	thms cr	yptograj	phy an	d prog	amming	g langu	ages.	
	interp	nterpret: error correction and computation of fault-tolerant.										
CO3	detern	nine the	relation	ship of	quantu	m with:	mather	natics,				
	physic	es.										
	Illustr	ate the r	elations	ship bety	veen qu	iantum a	and cla	ssical o	complex	ity clas	sses.	
CO4	analyz	ze: quar	ntum p	rogramn	ning la	inguages	s, qua	ntum o	computa	tions,e	rror corr	ection,
~~~	fault-t	ult-tolerant computation.										
CO5	compa	ompare: quantum algorithms, classical and quantum information theory, classical gates										
	and qu	and quantum gates.										
		Monn	ing Mo	triv for	Cours		w/cet					
(	U-PEU	) mapp	ing wia	urix for	Cours	e Ivi. iet	:II/C51	/F 1/5	<b>DSC3</b> (1	<b>III</b> )		
Cos	PE	.01		PEO2		P	EO3		PEO4	ŀ	PEC	)5
CO1		1		1			3		3		3	
CO2	,	2		2			3		3		3	
CO3	,	3		3			3		3		3	
CO4	,	3		3			3		3		3	
CO5	,	3		3			3		3		3	
Average	2	.4		2.4			3		3		3	
	CO-PO Mapping Matrix for Course M.Tech/CSE/PT/3/DSC3(iii)											
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	) PO11	PO12





CO 1	1	3	1	1	1			_			1	3
$CO^2$	2	1	1	3	1	   _	_	_	_	   _	2	3
<u> </u>	3	1	1	3	3	   _		_		   _	3	3
<u> </u>	3	3	1	3	1	-		-	_	-	3	3
CQ.5	3	1	1	3	3	-	_	_	-	-	3	3
Average	2.4	1.8	1	2.6	1.8	-	-	_	_	-	2.4	3
	CO-PSC	) D Mapp	ing Ma	ıtrix for	Course	e M.Teo	:h/CSI	E <b>/PT/3</b> /	DSC3(i	ii)		
COs	F	PSO1		PSO2	2	Р	SO3		PSO4		PSC	)5
CO1		3		2			1		-		3	
CO2		3		2			2		-		3	
CO3		3		2			3		-		3	
CO4		3		2			3		-		3	
CO5		3		2			3		-		3	
Average		3		2			2.4		-		3	
Course Content												
Unit - I Unit - II Unit - III	Unit - IIntroduction to Quantum Computation: Concept and need of quantum computing, Quantum bits and quantum operations, Postulates of quantum mechanics, Bloch sphere representation of a qubit, multiple qubits, classical gates versus quantum gates.Unit - IIBackground Mathematics and Physics: Hilber space, Probabilities and measurements, entanglement, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Quantum Circuits: single qubit gates, multiple qubit gates, design of quantum circuits.Unit - IIIQuantum Information and Cryptography: Comparison between classical and quantum information theory. Bell states. Quantum teleportation. Quantum Cryptography, no cloning theorem, Quantum programming languages, Probabilistic and Quantum computations.									nputing, n sphere rements, chanics, lits. quantum bhy, no Quantum		
Unit - IV	Unit - IVQuantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor factorization, Grover search. Noise and error correction: Graph states and codes, Quantum error correction, fault- tolerant computation.								tionship 's-Jozsa n, fault-			
		<b>T</b> . <b>1</b>		1 ext/Ke	rerence	BOOKS		1			2000	
Text Books	<ol> <li>An Introduction to Quantum Computing Algorithms, Pittenger A. O., 2000.</li> <li>Quantum computing explained, David McMahon, John Wiley &amp; Sons, Inc Publication 2008</li> <li>Quantum computation and quantum information, Michael A. Nielsen and Isaac L Chuang, Cambridge University Press 2010</li> <li>Introduction to Quantum Mechanics, 2e, David J. Griffiths, Prentice Hall New Jersey 1995</li> </ol>									ns, Inc. Isaac L. v Jersey		





<b>Reference Books</b>	1.	Quantum computing for computer scientists, Noson S. Yanofsky, Mirco A. Mannucci, Cambridge University Press 2008
	2.	Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II: Basic Tools and Special Topics, Benenti G., Casati G. and Strini G., World Scientific,
		2004.

MTech/CSE/PT/3/CC9: Software Lab based on MTech/CSE/PT/3/CC7 (MATLAB Programming)										
Course Type	Course	Contact	Delivery	Maxim	um Marks	Exam	Assessment			
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods			
Practical	02	04	Lab Work	50 -		3 Hours	TEE/ Practical File			
Instructions to pa	aper setter	for Final Term	Examination	<b>1:</b> The Final	l Term examin	nation will b	e conducted by a			
panel of internal a	nd external	examiners. Exa	aminees will b	e evaluated	on the bases	of practical f	file, performance			
in practical and a v	viva voce ex	kam.								
<b>Course Objective</b> constructs of M. Programming.	es: The obj ATLAB a	ective of this ond their usage	course is to g e. This cours	et the stude se is based	ents hands on d on MTecl	h practice wi h/CSE/PT/3/	th programming CC7 MATLAB			
Course Outcom	nes At the	end of this cou	rse, the studer	nt will be ab	le to:					
CO1	define relate in MA	e: features, com d to input/outpu ATLAB.	mands, data ty 1t, file handlin	pes, hierarc g and graph	thy of operati	ons, matrix, tructure and	tools, functions toolboxes used			
CO2	CO2 describe: history, origin, features, commands, data types, hierarchy of operations, matrix, tools, functions related to file, function related to graphics, control structure and various toolboxes of MATLAB									
CO3	use: c funct simul	use: commands, operations, tools, menus, toolbars, input/output functions, file handling, functions related to graphics, 2D and 3D plotting, control structure, debugging, simulink and image & video processing toolboxes in MATLAB								
CO4	analyz	ze: commands,	data types, o	perations, c	control struct	ure, matrix,	tools, different			

001	analyze. com	manab, aada cypeb, or	ciunons, control i	fildetale, indian	, cools, annerene				
	functions relat	functions related to graphics and file handling in given MATLAB program.							
CO5	determine: co	mmand, data type, to	ol, menu, control	structure, debug	gging technique,				
	function, featu	are or toolbox of MAT	LAB to use in give	n condition.					
CO6	create: basic of	or advanced program i	n MATLAB using	different comma	ands, 2D and 3D				
	plotting, funct	tions, tools, features, s	simulink, fuzzy log	gic, neural netwo	ork and image &				
	video processi	ing toolbox of MATLA	AB.		-				
	CO-PEO Ma	pping Matrix for Co	urse MTech/CSE/	PT/3/CC9					
Cos	PEO1	PEO2	PEO3	PEO4	PEO5				
CO1	1	1 1 3 3 3							





CO2		2		2			3		3			3	
CO3		3	3			3				3		3	
CO4		3		3			3		3			3	
CO5		3		3			3			3		3	
CO6	.	3		3			3			3		3	
Average	2	.5		2.5			3			3		3	
	<b>CO-</b> ]	PO Maj	ping N	latrix fo	or Cou	rse MTe	ech/CS	SE/P	'T/3	/CC9			
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	РО	8	PO9	PO10	) PO11	PO12
CO1	1	3	1	1	1	-	-	-		-	-	1	3
CO2	2	1	1	3	1	-	-	-		-	-	2	3
CO3	3	1	1	3	3	-	-	-		-	-	3	3
CO4	3	3	1	3	1	-	-	-		-	-	3	3
CO5	3	1	1	3	3	-	-	-		-	-	3	3
CO6	3	3	3	3	3	-	-	-		-	-	3	3
Average	2.5	2	1.33	2.67	2					-	2.5	3	
	CO-P	'SO Ma	pping N	Matrix f	or Cou	irse MT	lech/C	SE/F	PT/3	3/CC9			
Cos	F	'SO1		PSO2	2	P	SO3			PSO4	ł	PSC	)5
CO1		3		3			1			_		3	
CO2		3		3			2			-		3	
CO3		3		3			3			-		3	
CO4		3	3			3			-		3		
CO5		3		3		L	3		-			3	
CO6		3		3		Ļ	3		-			3	
Average		3		3			2.5			-		3	

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MTech/CSE/PT/4/CC10: Python Programming								
Course Type	Course	Contact	Delivery	Maxim	um Marks	Exam	Assessment	
	Credit	Hours/Wee k	Mode	Externa l	Internal	Duration	Methods	
Compulsory Theory	04	04	Lecture	70	30       20     5       5	3 Hours	TEE/MTE/ Assignment/ Attendance	

**Course Objectives:** The objectives of this course is to get the students familiar with basic concepts of Python programming, decision making and functions, file handling and object oriented programming concepts, database programming and to implement machine learning concepts.

Course Outcomes	At the end of this course, the student will be able to:													
CO1	define: oriente	define: installations, working, structures, control statements, operators, lists, object												
CO2	explain librarie	n: cond	litional packag	& contest of py	ntrol sta ython pro	tem ogra	ents mm	s, string	gs, OO	Ps ,file	e handli	ng con	cepts,	
CO3	use: va apply:	rious p python	ython l progra	ibraries mming	s such as constru	nur cts t	npy o so	, matpl olve rea	otlib ,p 1 world	andas . l proble	ms.			
CO4	catego python	rize: d i librari	ata typ es.	es, dic	ctionarie	s, c	ond	litional	& co	ntrol st	tatement	s, func	tions,	
CO5	compa librarie	re: data es.	a types,	diction	naries, co	ondi	tion	al & co	ontrol s	tatemer	nts, func	tions, p	ython	
CO6	design	: basic	and adv	vanced	applicati	ions	in J	python.						
CO-PEO Mapping Matrix for Course MTech/CSE/PT/4/CC10														
COs		PEO	l		PEO2			PEO	3	P	EO4		PEO5	
CO1		1			1			3			3		3	
CO2		2			2			3			3		3	
CO3		3			3			3			3		3	
CO4		3			3			3			3		3	
CO5		3			3			3			3		3	
CO6		3			3			3			3		3	
Average	2.5 2.5 3 3 3							3						
	CO-	PO Ma	pping	Matrix	for Co	urse	M	Tech/C	SE/PT	/4/CC1	0			
COs	PO1	PO2	PO3	PO4	PO5	PC	)6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	1	3	1	1	1	-		-	-	-	-	1	3	





CO2	2	1	1	3	1	-	-	-	-	-	2	3	]
CO3	3	1	1	3	3	-	-	_	_	-	3	3	
CO4	3	3	1	3	1	-	-	-	-	-	3	3	
CO5	3	1	1	3	3	-	-	-	_	-	3	3	
CO6	3	3	3	3	3	-	-	-	-	-	3	3	
Average	2.5	2	1.3	2.6	2	-	-	-	-	-	2.5	5 3	
	CO-P	PSO M	apping	Matri	x for Co	urse N	/ /Tech/(	CSE/P1	Г/4/CC	10	ļ	I	
COs		PSO	l	Ì	PSO2		PS	O3		PSO4		PSO	5
CO1		3			3		]	l		-		3	
CO2		3			3		2	2		-		3	
CO3		3			3			3		-		3	
CO4		3			3			3		-		3	
CO5		3			3			3		-		3	
CO6		3			3		3	3		-		3	
Average		3			3		2.	.5		-		3	
Unit – I Unit – II	Course Content         MTech/CSE/PT/4/CC10: Python Programming         Unit – I       Installation and Working with Python, Using Help, Structure of a Python Program, Control flow, Interpreter shell, Tokens, Identifiers, Reserved keywords, Literals, Variables, Python basic Operators, Declaring and using Numeric data types: int, float, complex, using string data type. Python Casting, Scope of a Variable, Working with: String, List, Tuples and Dictionaries.         Unit – II       Conditional blocks using if, else and elif, For loops in python, While loops, Continue, Break and Else, organizing python codes using functions, Modules: Creating Module, using Modules and Built-in Modules. Packages: Package Types, Importing Package, Viewing Package Content and Documentation.												
Unit – III Unit – IV	Set .	Object Oriented Programming: Concept of Class, Object and Instances, Constructor, Class Attributes and Destructors, Built-in Class Attributes, Inheritance, Method Overriding, Data Encapsulation, Overloading Operators, Data Hiding, Exception Handling, Programming using Oops concepts. File Handling: Creating, Opening, Closing, Writing & Reading File Content, Deleting a File. Programming using file operations.Python NumPy: Array Slicing, Array Indexing, Data Types, Array Shape & Reshape, Array Join, Array Split, Random.											-
	at	m						137	the				

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	Python Pandas: Data Frames, Read CSV, Analyzing Data and Cleaning Data. Python Matplotlib: Line, Grid, Scatter, Bars, Histograms and Pie Charts.
	Text/Reference Books
Text Books	<ol> <li>Chun, J Wesley, Core Python Programming, 2e, Pearson, 2007.</li> <li>E. Balagurusamy, Introduction to Computing and Problem Solving Using Python, McGraw Hill Education, 2016.</li> </ol>
Reference Books	<ol> <li>Barry and Paul, Head First Python, 2e, O Reilly, 2010.</li> <li>Lutz and Mark, Learning Python, 4e, O Reilly, 2009</li> </ol>

MTech/CSE/PT/4/CC11:Research Methodology									
Course	Course Course Contact			Maximu	ım Ma	urks		Exam	Assessment
Туре	Credit	dit Hours/ Mode Week		External	Int	terna	1	Duration	Methods
Optional Theory	04	04	Lecture	70		30		3 Hours	TEE/MTE/
Theory					20	5	5		Attendance

**Course Objectives:** The objective of this course is to get the students familiar with different aspects of research methodology, namely, research design, collection and analysis of data, and interpretation of results.

Course Outcomes	At the end of this course, the student will be able to :
CO1	define: objectives, hypothesis, interpretation, data analysis, data collection,
	research design and method, interpretation, data analysis, sampling.
CO2	describe: objectives, hypothesis, interpretation, data analysis, data collection,
	research design and method, interpretation, data analysis, sampling.
CO3	Illustrate: measurement. data collection, processing, sampling, analysis and its
CO4	categorize: research, sampling methods, data collection techniques, reports
	and data processing strategies.
	perform: data analysis.
CO5	compare: sampling methods, data collection techniques, reports and data
	processing strategies.
CO6	create: thesis, reports.
	design: research tool.
	interpret(drive): results.



C	O-PE(	) Maj	pping M	Iatrix	for Co	urse N	ITech/C	CSE/	PT/	4/CC1	1		
Cos	PE	EO1		PEO	2		PEO3			PEO4		PEO5	
CO1		1		1			3		3			3	
CO2		2		2			3		3			3	
CO3		3		3			3			3		3	
CO4		3		3			3			3		3	3
CO5		3		3			3			3		3	3
CO6		3		3			3			3		3	3
Average	2	2.5		2.5			3			3		3	3
C	CO-PO	) Map	ping M	atrix f	for Cou	ırse M	Tech/C	SE/I	PT/4	/CC11			
Cos													
	P01	P02	PO3	P04	PO5	P06	PO7	P08		P09	P010	P011	P012
CO1	1	3	1	1	1	-	-	í	3	-	3	1	3
CO2	2	1	1	3	1	-	-	í	3	-	3	2	3
CO3	3	1	1	3	3	-	-	í	3	-	3	3	3
CO4	3	3	1	3	1	-	-		3	-	3	3	3
CO5	3	1	1	3	3	-	-	í	3	-	3	3	3
CO6	3	3	3	3	3	-	-	í	3	-	3	3	3
Average	2.5	2	1.3	2.6	2	-	-		3	-	3	2.5	3
C	O-PS(	) Map	oping M	latrix	for Co	urse N	ITech/C	CSE/	PT/	<b>4/CC1</b>	1		
Cos	PS	01	Р	SO2		Р	SO3			PSO4	-	PS	05
CO1	3	3		3		1			3			3	
CO2	3	3		3		2			3			3	
CO3	3	3		3			3			3		3	3
CO4	3	3		3			3			3		3	3
CO5	3	3		3			3			3		3	3
CO6	3	3		3			3			3		3	3
Average	3	3		3			2.5			3		3	3
Course Content MTech/CSE/PT/4/CC11: Research Methodology													
Unit – I       Objectives and types of research: motivation and objectives- research methods vs. methodology, types of research- descriptive vs. analytical, applied vs. fundamental, quantitative vs. qualitative, conceptual vs, empirical research formulation: defining and formulating the research problem selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-													





	primary and secondary source reviews, hypothesis- definition, qualities of a good hypothesis, null hypothesis and alternatives.							
Unit – II	Research design and methods: basic principles, need of research design- features of good design, important concepts relating to research design, criteria of selecting a sampling procedure, characteristics of a good sample design, sampling methods, measurement: concept of measurement, problems in measurement in research - validity and reliability. levels of measurement- nominal, ordinal, interval, ratio.							
Unit – III	Data collection and analysis: execution of the research, observation and collection of data, methods of data collection, data processing and analysis strategies, data analysis with statistical packages, hypothesis testing, generalization and interpretation, univariate analysis (frequency tables, bar charts, pie charts, percentages).							
Unit – IV	Meaning of interpretation, need of interpretation, technique of interpretation, precaution in interpretation, layout of a research paper, journals in computer science, impact factor of journals, ethical issues related to publishing, plagiarism and self-plagiarism. reports and thesis writing: structure and components of scientific reports, types of report- technical reports and thesis, writing-synopsis, abstract, illustrations and tables results summary reference citing and listing.							
	Text/Reference Books							
Text Books	<ol> <li>J. Garg, B.L, Karadia, R, Aggarwal F, An Introduction to Research Methodology, RBSA Publishers, 2002.</li> <li>Kothari,C.R, Research Methodology: Methods and Techniques. New Age International, 1990</li> <li>Santosh Gupta, Research Methodology and Statistical Techniques, Deep &amp; Deep Publications Pvt. Ltd., 2008</li> </ol>							
Reference Books	<ol> <li>N. Gurumani, Scientific Thesis Writing and Paper Presentation, MJP Publishers. Montgomery, Douglas C, Design and Analysis of Experiments, Wiley India Pvt. Ltd.</li> </ol>							

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	MTech/CSE/PT/4/DSC4(i): Data Warehousing and Data Mining									
Course Type	Course	Contact	Delivery	Maxim	um Marks	Exam	Assessment			
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods			
Optional Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/ Attendance			

**Course Objectives**: The objective of this course is to get the students familiar with different concepts of data warehouse and data mining, namely, OLAP, Association rule mining, classification and prediction.

Course Outcomes	At the end of this course, the student able to :
CO1	define: the concepts of data mining, data pre-processing, outliers, data warehouse,
	OLAP, association rule mining, data classification prediction and cluster Analysis.
CO2	describe: key process of data mining ,data warehousing, OLAP, data warehousing to
	data mining, association rule, classification and prediction methods.
CO3	apply: OLAP technology and association rules.
	use: decision induction, bayesion and back propagation classification methods.
CO4	differentiate: operational database systems and data warehousing, single dimensional and multidimensional association rules, and between various data mining classification methods.
CO5	evaluate: data mining and data warehouse, OLAP technology, single and multi- dimensional association rule.

CO-PEO Mapping Matrix for Course MTech/CSE/PT/4/DSC4(i)												
COs		PEO1		PEO2			PEO3			PEO4		EO5
CO1		1		1			3		3			3
CO2		2	ĺ	2			3		3			3
CO3		3		3			3		3			3
CO4		3	Ì	3			3		3			3
CO5		3	Ì	3			3			3		3
Average		2.4		2.4	1		3			3		3
	CO-P	О Марр	ing Ma	atrix fo	or Cou	rse MT	ech/CS	E/PT/4	4/DSC4	l(i)		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	1	1	-	-	-	-	-	1	3
CO2	2	1	1	3	1	-	-	-	-	-	2	3
CO3	3	1	1	3	3	-	-	-	-	-	3	3



CO4	3	3	1	3	1	-	-	-	-	-	3	3			
CO5	3	1	1	3	3	-	-	-	-	- 3		3			
Average	2.4	1.8	1	2.6	1.8	-	-	-	-	-	2.4	3			
	CO-PS	SO Map	ping M	latrix f	or Cou	rse M	Fech/C	SE/PT/	/4/DSC	<b>4(i)</b>					
COs	]	PSO1		PSO	2		PSO3		PSO4 PSO5						
CO1		3 3 1 - 3										3			
CO2		3		3			2			-		3			
CO3		3		3			3			-		3			
CO4		3		3			3			-		3			
CO5		3		3			3			-		3			
Average		3		3			2.4			-		3			
Course Content MTech/CSE/PT/4/DSC4(i): Data Warehousing and Data Mining															
mining, kind of data, Functionalities, interesting patterns, classification of data mining system, Major issues, Data Mining Primitives. Data Pre-processing: Data cleaning, Data Integration and transformation, Data reduction, Discretization and concept hierarchy generation. Data visualization. Outliers, Types of Outliers and challenges of Outlier Detection															
Unit - II	Data v betwee Model, to data	varehous n opera Data w mining,	se and tional arehou Data v	OLAP data ba se Arcl varehou	P Techi ise syst hitectur ise usag	nology æms an e, Data ge.	for da nd data wareh	ta min wareh ouse In	ing: da nouse, A npleme	ta ware A Multi ntation,	house, d dimensio data wa	difference onal Data rehousing			
Unit - III	Associ transac Mining From a	ation Ru tional d g multidi ssociatio	ule Mi atabase mensic on min	ning: 1 es, min onal ass ing to c	Mining ing mu ociatio orrelati	single ltilevel n rules on ana	-dimen associ from re lysis, co	sional ation r elationa onstrain	Boolea ules fro il databa nt-based	n assoc om trans ases and l associa	iation re saction of data wa tion Min	ules from databases, arehouses, ning.			
Unit - IVData Mining-Classification and Prediction: issues regarding classification and prediction, classification by decision induction, Bayesian classification, classification by back propagation, classification based on concepts from association rule mining other classification methods.Cluster Analysis: What is Cluster Analysis, Types of Data in Cluster Analysis, Applications and Trends in Data Mining.															
				Text/F	Referen	ce Boo	ks								
Text Books.	1. Ale 2. Ad	e Berson ruaans, I	i, Steph Longm	ien Smi an, Ado	ith, Kor dison-w	thTheo vesley I	rling, I Data Mi	Data Mi ining,	ning,Tl	MH.					
	Ctt							PG Bos	·Dal	2					





	3. Addison-Wesley Longman, Data Warehousing in the Real World.							
Reference Books	<ol> <li>Chanchal Singh, Data Mining and Warehousing, Wiley.</li> <li>Jiawei Han and MichelineKamber, Data Mining: Concepts and Techniques, San Francisco: Morgan Kaufmann Publishers, 2001.</li> </ol>							

	МТес	ch/CSE/P	Г/4/DSC4	(ii) Big D	ata Analy	tics		
Course Type		Course	Contact	Delivery	Maximu	m Marks	Exam	Assessment
		Credit	Hours/ Week	Mode	External	Internal	Duration	Methods
Optional Theory		04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignmen/ Attendance
<b>Instructions to paper</b> questions in all. First each covering the who two questions from ea of 15 marks each selec	setter for l question wi le syllabus. ch of the fo ting at least	Final Ter Il be com In additio our units. one ques	m Exam pulsory a on, eight The cano tion from	ination: 7 and will c more que lidates are n each unit	The quest consist of stions wil e required t.	ion paper five short l be set un to attemp	will con questions nit-wise co of four mo	sist of nine s of 2 marks omprising of ore questions
Course Objectives: The	e objective o	of this cou	rse is to	get the stu	dents fami	liar with c	concepts of	f big data, its
architecture and applicat	Ions; NoSQL	$\frac{1}{2}$ and HAL	POOP.	udent woul	d have und	lorstanding	r of:	
COII Se Outcomes	define: Big tools and H HDFS, Had	At the end of this course, the student would have understanding of: define: Big Data and Hadoop, digital data, Apache Hadoop, analysing Data with Unix tools and Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, HDFS, Hadoop Ecosystem, Pig, Hive shell and services, HBasics, Big SQL.						
CO2 CO3	understand Hadoop St Distributed task executi apply and	understand and describe: Big Data and Hadoop, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Hadoop Distributed File System, command line interface, job scheduling, shuffle and sort, task execution, Hadoop Ecosystem, Pig, HiveQL, Hbase. apply and use: Apache Hadoop, HDFC, HBasic, Big Data and Hadoop, HDFS						
CO4	command line interface, Hadoop file system interfaces, data flow, Hive services. classify:Big Data and Hadoop, Big Data Analytics, Apache Hadoop, HDFS, Hive shell, Hive services.							
CO5	Compare feature set of Pig, hadoop, HDFC							
C	<b>D-PEO Map</b>	ping Mat	rix for Co	ourse MTe	ch/CSE/P	T/4/DSC4	(ii)	
COs	PEO	1	PEO2	2	PEOS	3	PEO4	PEO5





Γ	1		1								1			1	h
	CO	01		1		1				3		3		3	
	CO	2		2		2 3					3		3	-	
	CO	3		3		3				3				3	-
	CO	4		3	3				3			3		3	
	CO	5		3		3	1			3		3		3	
	Avera	age		2.4		2.	4			3		3		3	
	CO-PO Mapping Matrix for Course MTech/CSE/PT/4/DSC4 (ii)														
	CO	s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
	СО	1	1	3	1	1	1	-	-	-	-	-	1	3	
	CO	2	2	1	1	3	1	-	-	-	-	-	2	3	
	CO	3	3	1	1	3	3	-	-	-	-	-	3	3	
	CO	4	3	3	1	3	1	-	-	-	-	-	3	3	
	CO	5	3	1	1	3	3	-	-	-	-	-	3	3	
	Avera	age	2.4	Image: Image shows a start								3			
	CO-PSO Mapping Matrix for Course MTech/CSE/PT/4/DSC4 (ii) 2.											2.4			
	CO	S	]	PSO1		PSC	02		Р	SO3		PSO ₄	4	PSO5	-
	CO	1		3		3				1		-		3	-
	CO	2		3		3				2		-		3	
	CO	3		3		3				3		-		3	
	CO	4		3		3				3		-		3	
	CO	5		3		3				3		-		3	-
	Avera	age		3		3				2.4		-		3	ļ
				<b>N</b> (17)		Cours	e Cont	ent							
_				Mile	ch/CS	E/PT/4/I	DSC4	(ii): Bi	ig Dat	a Anal	ytics				
l	Unit I	Introduction	n to E	Big Data	and H	ladoop:	Types	of dig	ital da	ta, intr	oductio	on to Big	Data, V	s of Big	
		Data, Big I	Jata A Data	Analytics	s, Hist Iadoor	ory of H	adoop,	, Apac eamin	ne Ha	idoop, a	analysii Echo	ng Data v System	With Ur	lix tools,	
		Strategy.Bi	g Dat	a applica	tions.	, 11au00	sp su	camm	g, 11a	uoop		System,		ng Data	
L					-										
l	Unit - II	HDFS (Had	loop l	Distribut	ed File	System	):The c	lesign	of HD	FS, HI	DFS co	ncepts, co	omman	d line	
		archives H	ladooj adoor	p file sys	stem in mpress	terfaces,	data f alizatio	low, d on Av	ata ing ro and	gest wit I file-ba	h flume ased dat	e and Sco	op and res	Hadoop	
	[]nit_III	Man Reduc	e•∆n	atomy of	a Mar	Reduce	ioh ru	n fail	urec i	oh sche	duling	shuffle a	and sort	task	
	Unit - 111	execution, 1	Map I	Reduce ty	ypes a	nd forma	ts, Ma	p Redu	ice fea	atures.	aunng,	, 51101110 6	ana 5011	, wor	
1	Unit – IV	Pig: Introdu	iction	to Pig, e	executi	on mode	es of Pi	g, con	nparis	on of P	ig with	database	s, grunt	, Pig	
	latin, user defined functions, data processing operators.														
L		Hive: Hive	shell	, Hive se	ervices	, Hive n	netasto	re, cor	nparis	on with	n traditi	ional data	abases,	HiveQL,	]
		10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -							0		-	1000			

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	tables, querying data and user defined functions. Hbase: HBasics, concepts, clients, example, Hbase versus RDBMS. Big SQL: Introduction										
Text/Reference Books											
Text Books	<ol> <li>Tom White "Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.</li> <li>SeemaAcharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015.</li> <li>ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press.</li> </ol>										
Reference Books	<ol> <li>Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.</li> <li>Jay Liebowitz, "Big Data and Business Analytics" AuerbachPublications, CRC press (2013)</li> <li>AnandRajaraman and Jeffrey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.</li> <li>Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley &amp; Sons, 2012.</li> </ol>										



	MTech/CSE/PT/4/DSC4 (iii) Data Science												
Course Type	Course	Contact	Delivery	Maxim	um Marks	Exam	Assessment						
	Credit	Hours/Week	Mode	External	Internal	Duration	Methods						
Optional Theory	04	04	Lecture	70	30	3 Hours	TEE/MTE/ Assignment/ Attendance						

**Course Objectives**: The objective of this course is to get the students familiar with the concepts of data science, data analysis and associated visualization techniques.

Course Outcomes	At the e	At the end of this course, the student would have an understanding of:								
CO1	define: data ana inferenc database	define: data science process, classification of data, big data, web data, sa data analysis techniques-correlation, regression, mean, mode, kurtosis, I inference etc., neural network, fuzzy logic, rule of mining, hadoop, hiv database, and visualization.								
CO2	understa data, ev techniqu logic, da	understand and describe: graphical representation of data, storage and red data, evolution of analytic scalability, sampling distribution, data techniques, Bayesian model and network, induction rule, neural network logic, data mining techniques, data analysis framework and visualization								
CO3	use: dat analysis techniqu visualiz	use: data science process, modern data analytic tools, statistical concepts, data analysis techniques, Bayesian network, induction rule, fuzzy logic, data mining techniques, hadoop file system, hive, S3, cloud database, inference and visualization.								
CO4	categori samplin tempora	ize: analytic processe g, data analysis techn ll and spatial mining, e	s and tools, analy iques, linear and r gonets systems an	vsis, reporting, s non-linear time s d application.	sampling and re- series, sequential,					
CO5	choose: samplin data ana	choose: data science process, data storage, data analytic tools and processes, sampling method, data analysis technique, time series, mining techniques, visual data analysis framework and technique suitable in given situation.								
CO	)-PEO Mapp	ing Matrix for Cours	se MTech/CSE/PT	C/4/DSC4 (iii)						
Cos	PEO1	OI PEO2 PEO3 PEO4 PEO5								

Cos	PEO1	PEO2	PEO3	PEO4	PEO5				
CO1	1	1	3	3	3				
CO2	2	2	3	3	3				
CO3	3	3	3	3	3				
CO4	3	3	3	3	3				
CO5	3	3	3	3	3				
Average	2.4	2.4	3	3	3				
CO-PO Mapping Matrix for Course MTech/CSE/PT/4/DSC4 (iii)									



COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	1	1	-	-	-	-	-	1	3
CO2	2	1	1	3	1	-	-	-	-	-	2	3
CO3	3	1	1	3	3	-	-	-	-	-	3	3
CO4	3	3	1	3	1	-	-	-			3	3
CO5	3	1	1	3	3	-	-	-	-	-	3	3
Average	2.4	1.8	1	2.6	1.8	-	-	-	-	-	2.4	3
(	CO-PSO	) Mapp	oing Ma	atrix for	r Cours	e MTeo	h/CSI	E <b>/PT/4</b> /	DSC4 (	iii)		
COs		PSO1		PSO	2	P	SO3		PSO ₂	1	PSO	D5
CO1		3		3			1		-		3	
CO2		3		3			2		-		3	
CO3		3		3			3		-		3	
CO4		3		3			3		-		3	
CO5		3		3			3		-		3	
Average	Average         3         3         2.4         -         3											
Course Content MTech/CSE/PT/4/DSC4 (iii):Data Science												
Unit – II	of data, graphical presentation of data, classification of data, storage and retrieval of data, big data, challenges of conventional systems, web data, evolution of analytic scalability, analytic processes and tools, analysis vs reporting, modern data analytic tools; Statistical Concepts: sampling distributions, re-sampling, statistical inference, prediction 											
	networ Analys	ks, supp is of Tir	oort vec me Seri	tor and l es: linea	kernel n ur systen	nethods ns analy	; ysis, no	onlinea	r dynam	ics.		
Unit - III	Unit - III       Data Mining Techniques: Rule induction: neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy Logic: extracting fuzzy models from data, fuzzy decision trees, stochastic search methods, neuro fuzzy modelling, Association Rule Mining: clustering, outlier analysis, sequential pattern mining, temporal mining, spatial mining, web mining											
Unit – IVData Analysis Frameworks and Visualization: Map Reduce, Hadoop, Hive, sharding, NoSQL databases, cloud databases, S3, Hadoop Distributed File Systems, visualizations, visual data analysis techniques, interaction techniques, social network analysis, collective inferencing, Egonets systems and applications.												
				Text/R	eferenc	e Book	s					
Text Books.	1. Mi	chael B	erthold,	David.	J. Hand,	, "Intell	igent I	Data An	alysis",	Springe	er, 2007	
Stu Py Borbar [5]774												





	<ol> <li>AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.</li> </ol>
Reference Books	<ol> <li>Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley &amp;Sons, 2012.</li> <li>Jiawei Han, MichelineKamber "Data Mining Concepts and Techniques", 2e, Elsevier.</li> <li>Rachel Schutt, Cathy O'Neil, "Doing Data Science", O'Reilly Publishers, 2013.</li> <li>Foster Provost, Tom Fawcet, "Data Science for Business", O'Reilly Publishers, 2013.</li> <li>Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2014.</li> <li>S. N. Sivanandam, S. N Deepa, "Introduction to Neural Networks Using Matlab 6.0", Tata McGraw- Hill Education, 2006.</li> </ol>



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MTech/CS	MTech/CSE/PT/4/CC12: Software Lab based on MTech/CSE/PT/4/CC10 (Python Programming)											
Course Type	Course	Contact	Delivery Mode Maximum Marks		um Marks	Exam	Assessment					
	Credit	Hours/Week		External Internal		Duration	Methods					
Practical	02	04	Lab Work	50	-	3 Hours	TEE/					
							Practical File					

**Instructions to paper setter for Final Term Examination:** The Final Term examination will be conducted by a panel of internal and external examiners. Examinees will be evaluated on the bases of practical file, performance in practical and a viva voce exam.

**Course Objectives:** The objective of this course is to perform the modeling and simulation experiments with Python. Concepts covered in MTech/CSE/PT/4/CC10 will be implemented.

- -												
Course Outcomes	At the end of this course, the student will be able to:											
CO1	define: installations, working, structures, control statements ,operators, lists ,object oriented programming concepts, python libraries.											,object
CO2	explain: conditional & control statements, strings, OOPs, file handling concepts, libraries and packages of python programming.											
CO3	use: various python libraries such as numpy, matplotlib, pandas . apply: python programming constructs to solve real world problems.											
CO4	categorize: data types, dictionaries, conditional & control statements, functions, python libraries.											
CO5	compare: data types, dictionaries, conditional & control statements, functions, python libraries.											
CO6	design: basic and advanced applications in python.											
CO-PEO Mapping Matrix for Course MTech/CSE/PT/4/CC12												
COs		PEO	l		PEO2 PEO3				PEO4		PEO5	
CO1		1			1			3				3
CO2		2			2			3				3
CO3		3			3 3				3		3	
CO4		3			3			3		3		3
CO5		3			3			3		3		3
CO6		3			3			3		3		3
Average		2.5			2.5			3		3		3
CO-PO Mapping Matrix for Course MTech/CSE/PT/4/CC12												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	1	1	-	-	-	-	-	1	3
CO2	2	1	1	3	1	-	-	-	-	-	2	3
CO3	3	1	1	3	3	-	-	-	-	-	3	3



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CO4	3	3	1	3	1	-	-	-	-	-	3	3
CO5	3	1	1	3	3	-	-	-	-	-	3	3
CO6	3	3	3	3	3	-	-	-	-	-	3	3
Average	2.5	2	1.3	2.6	2	-	-	-	-	-	2.5	3
0	CO-PSO Mapping Matrix for Course MTech/CSE/PT/4/CC12											
COs		PSO	1	PSO2			PSO3			PSO4		PSO5
CO1		3		3			1			-		3
CO2	3			3			2	ĺ	-		3	
CO3	3			3 3		3		-		3		
CO4	3			3		3		ĺ	-		3	
CO5		3			3		3			-		3
CO6		3			3		3			-		3
Average		3			3		2.5			-		3

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MTech/CSE/PT/5/SEC1:Dissertation											
Course	Course	ContactDeliveryHours/ModeWeek	Delivery	Maximu	ım Marks	Exam	Assessment				
Туре	Credit		Mode	External	Internal	Duration	Methods				
Research Work	20	04	-	400	100	-	Teacher interaction/ Dissertation/ Viva voce				

**Instructions to paper setter for Final Term Examination:** The Final Term examination will be conducted by a panel of internal and external examiners. Examinees will be evaluated on the bases of dissertation and a viva voce exam.

**Course Objectives:** The objective of this course is to inculcate a flavor of research in the scholars by allowing them to work on a real life research problem.

Course Outcomes	At the end of this course, the student will be able to :										
CO1	define: obj	define: objectives, hypothesis, interpretation, data analysis, data collection,									
	research de	research design and method, interpretation, data analysis, sampling.									
CO2	describe: objectives, hypothesis, interpretation, data analysis, data collection,										
	research design and method, interpretation, data analysis, sampling.										
CO3	Illustrate: measurement, data collection, processing, sampling, analysis and its										
	strategies, re	strategies, reports.									
CO4	categorize:	categorize: research, sampling methods, data collection techniques, reports,									
	and data pro	and data processing strategies.									
	perform: da	perform: data analysis.									
CO5	compare: sampling methods, data collection techniques, reports and data										
	processing strategies.										
CO6	create: thesis, reports.										
	design: research tool.										
interpret(drive): results.											
	О-РЕО Марр	oing Matrix for Co	urse MTech/CSE	/PT/5/SEC1							
Cos	PEO1	PEO2	PEO3	PEO4	PEO5						
CO1	1	1	3	3	3						
CO2	2	2	3	3	3						
CO3	3	3	3	3	3						
CO4	3	3	3	3	3						
CO5	3	3	3	3	3						
CO6	3	3	3	3	3						
Average	2.5	2.5	3	3	3						
CO-PO Mapping Matrix for Course MTech/CSE/PT/5/SEC1											





Cos												
	POI	P02	P03	P04	PO5	P06	PO7	PO8	P09	P010	P011	P012
CO1	1	3	1	1	1	-	_	3		3	1	3
CO2	2	1	1	3	1	-	-	3	-	3	2	3
CO3	3	1	1	3	3	-	-	3	-	3	3	3
CO4	3	3	1	3	1	-	-	3	-	3	3	3
CO5	3	1	1	3	3	-	-	3	-	3	3	3
CO6	3	3	3	3	3	-	-	3	-	3	3	3
Average	2.5	2	1.3	2.6	2	-	-	3	-	3	2.5	3
C	O-PSC	) Map	ping M	[atrix	for Co	urse M	[Tech/C	SE/PT/	5/SEC	1		
Cos	PSO	O1	Р	SO2		P	SO3		PSO4		PSC	)5
CO1	3	;		3		1			3		3	
CO2	3	;	3			2			3		3	
CO3	3	}	3			3			3		3	
CO4	3	;	3			3			3		3	
CO5	3	;	3			3			3		3	
CO6	3	;		3		3			3		3	
Average	3	;		3		2.5			3		3	

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