

CURRICULUM & SYLLABUS

(2020-REGULATION)

MASTER OF TECHNOLOGY COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING



I, Dr. S. GEETHA, Head of Computer Science and Engineering Department, hereby declare that this copy of the syllabus (M.Tech – Computer Science and Engineering - Full Time 2020 Regulation) is the final version which is being taught in the class and uploaded in our University website. I assure that the Syllabi available in our University website is verified and found correct. The Curriculum and Syllabi have been ratified by our Academic Council / Vice Chancellor.

Date:

Signature



DEPARTMENT VISION

To become a Premier Institution of Excellence in Computer Science and Engineering that would develop self-sustaining and globally competent Computer Science and Information Technology Professionals.

DEPARTMENT MISSION

- M1. Enable students and faculty with the best of Technologies and Knowledge emerging in the domain of Computer Science and Engineering.
- M2. Equip the department laboratories with the power of in-demand Technologies and Software for the On-Demand Industry.
- M3. Share and Collaborate knowledge across the IT Industries for holistic development of skilled and talented students.
- M4. Impart the students with Ethical values, Critical thinking and Broad based computational skills, to enable students to become Entrepreneurs.
- M5. Motivate the students to comprehend problems across Inter Disciplinary Domains and offer innovative solution using ICT.

PROGRAM OUTCOMES

- **PO1**. An understanding of the theoretical foundations and the limits of computing.
- **PO2.** An ability to adapt existing models, techniques, algorithms, data structures, etc. for efficiently solving problems.
- **PO3.** An ability to design, develop and evaluate new computer based systems for novel applications which meet the desired needs of industry and society.
- **PO4.** Understanding and ability to use advanced computing techniques and tools.
- **PO5.** An ability to undertake original research at the cutting edge of computer science & its related areas.
- **PO6.** An ability to function effectively individually or as a part of a team to accomplish a stated goal.
- **PO7.** An understanding of professional and ethical responsibility.
- **PO8.** An ability to communicate effectively with a wide range of audience.
- **PO9.** An ability to learn independently and engage in lifelong learning.
- **PO10.** An understanding of the impact of IT related solutions in an economic, social and environment context.

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PROGRAM SPECIFIC OUTCOMES

PSO1: Ability to analyze software product, design and develop computer programs in domain of computer science for efficient design of computer based system of varying complexity.

PSO2: Ability to take up higher studies, employability, research and development and entrepreneurship in the field of computer science and engineering.

ADMISSION CRITERIA

This course will offer specialization and hands on practical training with a potential for job placement in IT Industry. Candidates having Bachelor's degree in Engineering / Technology or equivalent in an appropriate area or MSc (Computer Science/Information Technology) or MCA from a recognized Institution and a valid GATE score in CS..

STRUCTURE AND DURATION OF THE COURSE

The total credits for this course will be 68. There are totally 11 theory papers, and 7 laboratory courses and 2 audit courses. The skeleton of course consists of 4 program core papers 5 elective papers, one open elective and Research methodology and IPR paper. Apart from this the student have to study 2 non credit audit courses. The seven laboratory courses includes core and elective labs, mini project with seminar, Dissertation –I/ Industrial Project and Dissertation-II. The entire course is spread over 4 semesters. The following Table represents the skeleton.

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Semester	No. of	Lab	Audit course
	Theory		
Ι	5	2	1
II	4	3	1
III	2	1	-
IV	0	1	-
TOTAL	11	7	2

STUDENT ASSESSMENT

Objectives

The primary objective of student assessment is to motivate them for right learning. The secondary objective is to ranking the students according to their academic performances.

Assessment Method

S.No.	Types	Internal Assessment Tests	Weightage	End Semester Examination	Weightage
1.	Theory	$T_1T_2T_3$	50	ET	50
2.	Practical	$P_1 P_2$	50	EP	50

Average of CAT - 1 and CAT - 2 marks + CAT - 3 marks shall be considered for grading.

Weightage for Internal Assessment

For evaluating the student, the weightage will be given as per the curriculum/scheme of evaluation for the Internal Assessment. The Internal Assessment will be done by way of conducting tests and Assignments. The structure of weightage of Internal Assessment is, 45% weightage for Continuous assessment Examination (CAT- 3), to be conducted at the end of a semester, 40% Weightage for CAT – 1 and CAT – 2 and 15% weightage for Assignment. If a student is not able to write any of the tests due to genuine reasons, the Head of the Department concerned may arrange to conduct a special test and the same may be considered for internal evaluation. However, not more than one such test shall be conducted for a student in a subject for the semester.



Attendance Requirement for Attending the End Semester Examinations

The teacher handling a subject of study must finalize the attendance percentage and performance report three days prior to the last instruction day of the subject of study in the semester and send it to Head of the Department and Dean. The students falling short of 75% attendance are normally not allowed to write the end semester examinations. However, those students who have less than 75% attendance for reasons of medical and other emergency situations can be considered for condoning of attendance by the Vice Chancellor provided their overall attendance in a subject of study including the period of illness etc., does not fall below 60%. If the attendance falls short due to medical ground backed by medical certificate, up to 5% shortfall can be condoned by the Dean and if it is more than 5%, the Vice Chancellor will have the discretionary power for condoning on a case-to-case basis. The students falling short of 60% attendance have to re-do the courses in the next academic year.

End Semester Examinations

Question papers for end semester examination will be set by External Examiners chosen from a panel of qualified and experienced teachers formed by the Controller of Examinations, under the advice of concerned Heads of the Departments and duly approved by the Vice Chancellor. Question Paper Passing Board will be set up by the Vice Chancellor for reviewing the question papers for end semester examinations.

Valuation of End Semester Examination Answer Papers

For all P.G. courses double valuation will be done; first by the internal faculty and the second by the external faculty. Any discrepancy of more than 15% marks may lead to third valuation and the averages of the nearest two valuation marks will be taken as the theory mark of candidate. For all Practical examinations, an external faculty member will be present for conducting the end semester examination and evaluating the student based on his Practical skills as well as knowledge to be ascertained by viva voce.

Project Evaluation

The continuous assessment carries 50% and is done through three seminar presentations and the end semester examination carries 50% for the report submitted and viva voce. For the final assessment, both internal as well as external faculty should be available for a joint assessment.

Passing Requirement

A candidate shall be declared to have passed the examination, if she/he secures not less than 50% of total marks prescribed for the course/subject of study with a minimum of 50% marks prescribed for the end semester examination, as certified by the result passing board.

A candidate is said to have qualified for the award of degree upon completion of 68 credits stipulated for M. Tech degree.



M.Tech – Computer Science and Engineering (Full Time)

Curriculum and Syllabus 2020 Regulation To be implemented from 2020-2021 Batch

		I SEMESTER					
S.No	Sub.Code	Title of Subject	Ty/Lb /ETL	L	Т	Р	C
1	MMA20C008	Applied Mathematics For Computer Engineers	Ту	3	0	0	3
2	MCS20C001	Advanced Operating System	Ту	3	0	0	3
3	MCS20E0XX	Elective-1	Ту	3	0	0	3
4	MCS20E0XX	Elective-2	Ту	3	0	0	3
5	MET20RM01	Research Methodology and IPR	Ту	2	0	0	2
6	MET20AUXX	Audit Course I	Ту	2	0	0	0
7	MCS20CL01	Advanced Operating System-Lab	Lb	0	0	4	2
8	MCS20ELXX	Elective-1 Lab	Ту	0	0	4	2
		Total		16	0	8	18

	II SEMESTER								
S.No	Sub.Code	Title of Subject	Ty/Lb /ETL	L	Т	Р	С		
1	MCS20C002	Advanced Algorithms	Ту	3	0	0	3		
2	MCS20C003	Soft Computing	Ту	3	0	0	3		
3	MCS20E0XX	Elective-3	Ту	3	0	0	3		
4	MCS20E0XX	Elective-4	Ту	3	0	0	3		
5	MET20AUXX	Audit Course II	Ту	2	0	0	0		
6	MCS20CL02	Advanced Algorithms Lab	Lb	0	0	4	2		
7	MCS20ELXX	Elective-4 Lab	Lb	0	0	4	2		
8	MCS20CL03	Mini Project with Seminar	Ty	2	0	0	2		
		Total		16	0	8	18		

L : Lecture T : Tutorial SLr : Supervised Learning P: Practical R : Research C : Credits Ty/Lb/ETL : Theory / Lab / Embedded Theory and Lab

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	III SEMESTER								
S.No	Sub.Code	Title of Subject	Ty/LB /ETL	L	Т	Р	С		
1	MCS20E0XX	Elective-5	Ту	3	0	0	3		
2	MET200EXX	Open Elective	Ту	3	0	0	3		
3	MCS20CL04	Dissertation-I	Ту	0	0	20	10		
		Total		6	0	20	16		

	IV SEMESTER							
S.No	Sub.Code	Title of Subject	Ty/LB/ ETL	L	Т	Р	С	
1	MCS20CL05	Dissertation-II	Ту	0	0	32	16	
		Total		0	0	32	16	

Summary of Credits:

Semester	Credits
Ι	18
II	18
III	16
IV	16
TOTAL	68

Theory and Lab Details

Semester	No. of Theory	Lab	Audit course
Ι	5	2	1
II	4	3	1
III	2	1	-
IV	0	1	-
TOTAL	11	7	2



	Elective I							
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С	
1	MCS20CE01	Advanced Computer Network	Ту	3	0	0	3	
L1	MCS20CEL1	Advanced Computer Network Lab	Lb	0	0	4	2	
2	MCS20CE02	Network Security And Cryptography	Ту	3	0	0	3	
L2	MCS20CEL2	Network Security And Cryptography Lab	Lb	0	0	4	2	
3	MCS20CE03	Advanced Data Science	Ty	3	0	0	3	
L3	MCS20CEL3	Advanced Data Science Lab	Lb	0	0	4	2	

		Elective II					
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С
1	MCS20CE04	Introduction To Intelligent System	Ту	3	0	0	3
2	MCS20CE05	Advanced Computer Architecture	Ту	3	0	0	3
3	MCS20CE06	Grid And Cloud Computing	Ту	3	0	0	3

		Elective III					
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С
1	MCS20CE07	Computer Vision	Ту	3	0	0	3
2	MCS20CE08	Human Computer Interaction	Ту	3	0	0	3
3	MCS20CE09	Natural Language Processing	Ту	3	0	0	3

	Elective IV							
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С	
1	MCS20CE10	Data Preparation And Analysis	Ту	3	0	0	3	
L1	MCS20CEL10	Data Preparation And Analysis Lab	Lb	0	0	4	2	
2	MCS20CE11	Formal Language And Automata Theory	Ту	3	0	0	3	
L2	MCS20CEL11	Formal Language And Automata Theory Lab	Lb	0	0	4	2	
3	MCS20CE12	Digital Forensics And Investigation	Ту	3	0	0	3	
L3	MCS20CEL12	Digital Forensics Investigation Lab	Lb	0	0	4	2	



	Elective V											
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С					
1	MCS20CE13	Internet Of Things	Ту	3	0	0	3					
2	MCS20CE14	Cloud Computing	Ту	3	0	0	3					
3	MCS20CE15	Game Theory	Ту	3	0	0	3					

	Audit course I&II												
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С						
1	MET20AU01	English for Research Paper Writing	Ту	2	0	0	0						
2	MET20AU02	Disaster Management	Ту	2	0	0	0						
3	MET20AU03	Sanskrit for Technical Knowledge	Ту	2	0	0	0						
4	MET20AU04	Value Education	Ту	2	0	0	0						
5	MET20AU05	Constitution of India	Ту	2	0	0	0						
6	MET20AU06	Pedagogy Studies	Ту	2	0	0	0						
7	MET20AU07	Stress Management by Yoga	Ту	2	0	0	0						
8	MET20AU08	Personality Development through life Enlightenment Skills	Ту	2	0	0	0						

	Open electives												
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С						
1	MET20OE01	Business Analytics	Ту	3	0	0	3						
2	MET20OE02	Industrial Safety	Ту	3	0	0	3						
3	MET20OE03	Operations Research	Ту	3	0	0	3						
4	MET200E04	Cost Management Of Engineering Projects	Ту	3	0	0	3						
5	MET20OE05	Composite Materials	Ту	3	0	0	3						
6	MET20OE06	Waste To Energy	Ту	3	0	0	3						



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Semester 1

Subject Co	ode		Subjec	t Name	:	Ty/L	b/ETL	L	Т	Р		С
		APPLII	ED MA	ATHEM	IATICS							
MMA200	2008	FOR C	OMPU	TER		r	Гу	3	0	0		3
	-	ENGIN	EERS				-					
L : Lecture	e T : Tu	torial S	Lr : Su	pervise	d Learn	ing P: Pr	oject F	R : Res	earch C : C	redits		
T/L/ETL :	Theory	/ Lab /	Embe	dded Th	eory an	d Lab						
OBJECTI	VES											
• Apj	ply the E	Basic coi	icepts i	n Algebi	ra							
• Use	e the Bas	sic conce	epts in	Regular	Express	ions						
• Ide	Identify and solve problems in Automata Theory											
Understand the Basic concepts Interpolation												
Apply the Basic concepts in Numerical integration												
COURSE	COURSE OUTCOMES (Cos)											
Students c	ents completing this course were able to											
COI	Demon	istrate k natics (1	nowle L1,L2,	dge of E L3)	Basic co	ncepts of	t Math	ematic	s science &	z Engineerin	ıg	
CO2	Calcula	alculate the required parameters using basic mathematical principles, and formulae										
	(L2,L3	(L2,L3,L4)										
CO3	Apply	mathem	natical	techniq	ues to so	olve prob	olems	(L2,L3	,L4)			
CO4	Examir	ne the re	elevan	t graphs	, and tee	chniques	to pro	vide so	olutions(L1	,L2,L3,L4)		
CO5	Examir	ne the tr	ees an	d prope	rties to	use real	time p	roblen	is for accur	ate results(L	.3,L4)
Mapping of	of Cours	e Outco	ome w	ith Prog	ram Ou	tcome (P	Os)					
Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PC)7	PO8	PO9	P	O10
CO1	3	3	1	1	2	2	1	-	-	3		3
CO2	3	3	1	2	3	1	1		-			1
CO3	3	3	2	2	3	2	1		-	2		3
CO4	3	3	2	2	1	2	1		1	2		3
CO5	3	3	2	2	2	2	1	.	1	2		2
COs/PSOs				Р	SO1					PSO2		
CO1					1					3		
CO2					1					3		
CO3					2					3		
CO4					2					3		
CO5					2					3		
3/2/1 Indic	ates Str	ength o	of Corr	elation,	3 - Hig	h, 2- Me	dium,	1- Lov	/			
Category	Basic Sciences	Engg.	Science	Humanities & social Science	Program Core	Program E	lective	Open Elective	Practical/Project	Internships/Tecl Skills	nnical	Soft Skills
	 											

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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
	APPLIED MATHEMATICS					
MMA20C008	FOR COMPUTER	Ту	3	0	0	3
	ENGINEERS					

UNIT I **ALGEBRAIC STURCTURES**

Groups (Definition and Examples) – Subgroups – Permutation groups – Homomorphism – Kernel – Cosets – Lagrange's theorem – Rings – Fields (Definition and Examples).

UNIT II FORMAL LANGUAGES

Regular expressions- Grammars - Context sensitive grammar - Context free grammar -Derivation trees – Finite state machine.

UNIT III **AUTOMATA THEORY**

Finite State Automata(FSA) – Deterministic FSA – Non-Deterministic FSA – Push Down Automata – Turing machine.

INTERPOLATION UNIT IV

Newton forward and backward differences - Central differences - Stirling's and Bessel's formulae – Interpolation with Newton's divided differences – Lagrange's method.

NUMERICAL DIFFERENTIATION AND INTEGRATION (9 hrs) UNIT V Numerical differentiation with interpolation polynomials - Numerical integration by Trapezoidal and Simpson's (both 1/3rd & 3/8th) rules – Two and three point Gaussian Quadrature formulae – Double integrals using Trapezoidal and Simpson's rules. Total no. of hrs: 45 Hrs

Reference Books:

- 1) Tremblay J.P., Manohar R., Discrete Mathematical structures with applications to Computer science, Tata McGraw Hill Publishing Co., (2016).
- 2) Kenneth Rosen, Discrete Mathematics and its applications (SIE), Tata McGraw Hill Publishing Co., (2018).
- 3) John C. Martin, Introduction to languages and the theory of computation $(3^{rd} ed.)$, Mcgraw Hill, (2018).
- 4) Hopcroft J.E., Ullman J.D., Introduction to Automata theory, Languages and Computation, Narosa Publishing house, (2016).
- 5) Veerarajan T., *Numerical Methods*, Tata McGraw Hill Publishing Co., (2018).
- 6) Sastry S.S., Introductory Methods of Numerical Analysis, Prentice Hall of India, (2016).

(9 hrs)

(9 hrs)

(12 hrs)



Subject	Code :	Subjec	t Name	:			Ty/Lb/	L	T/SLr	P/	C	
MCS200	2001	Advanc	ed oper	ating sy	vstem		ETL			R		
		Prerequ	111111111111111111111111111111111111	peratin	g Syste	m	Ty	3	0	0	3	
L : Lectu	ure T : Tut	orial S.L	r : Supe	rvised I	Learnin	g P : Pro	oject R:	Resea	arch C: C	redit	5	
T/L/ETI	L: Theory	/ Lab / E	mbedde	d Theor	y and L	Lab						
OBJEC	TIVES :				_							
• The	students w	ill unders	tand the	concept	ts of Ope	erating Sy	ystem and	proc	ess.			
● Illu:	strate the S	cheduling	of a pro	cessor f	or a give	n proble	m instance	e, ide	ntify the d	ead lo	ock	
situ	ation											
• To	provide app	ropriate s	olution,	analyze	memor	y manage	ement tec	nniqu	es and im	oleme	ent	
pag	e replaceme	ent Algori	thm, unc	lerstand	the imp	olementa	ition of file	syste	ems and di	recto	ries.	
• To a	ippreciate e	merging	rends in	operati	ng syste	ms.						
COURS	SE OUTCO	JMES (Cos) -	11								
Students	Students completing the course were able to											
CO1 Brief functions structures and history of operating systems												
	Mostor un	ctions, si	incores		story of	operation	ng system	lS notin	a arratama			
C02	Understanding of design issues associated with operating systems											
003	Understand various process management concepts including scheduling,											
004	synchronization, deadlocks and multithreading											
CO4	Master co	oncepts o	t memor	ry mana	igement		ng virtual	men	nory			
<u>CO5</u>	Master 1ss	sues relat	ed to Pr	ocessoi	schedu	iling						
Mappin	g of Cours	se Outco	mes wit	th Prog	ram O	utcomes	<u>s (POs)</u>	DC			DO10	
COS/PO	s POI	PO2	PO3	PO4	PO5	PO6	PO7	<u>PC</u>	08 PC)9	<u>PO10</u>	
	3	1	<u> </u>	3		2	2				3	
		2	1	1	3	3	2	1)	2	
C03	3	1	<u> </u>	3	1	2	2				3	
C04 C05	2	<u> </u>	1	1	3	3	2	1)	2	
	3	I		3		2	2	2			3	
COS/PS	Us				2				<u>PSO2</u>			
$\frac{001}{002}$					<u> </u>				1			
CO_2					1				<u> </u>			
C03					$\frac{2}{2}$				<u> </u>			
C04					<u> </u>				1 2			
05					1			1	Z			
y	s	s	itie ial	s l		с S	s	1/	uip al		ills	
501	JCe	Jce	ani	ran		ran ive	ive	ica	nsh nic	s	Ski	
ate	asic	ngg Xier	um & S	ciei) Te	og	per ect	act	ter , sch	dill	oft	
Ü	N B	ХĒ	H s's	Pr Pr El				Pr	Ll /S	SI	S	
				✓								



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20C001	Advanced Operating System	Ту	3	0	0	3

UNIT-I :INTRODUCTION

Function of an Operating System-Design Approaches-Types of Advanced Operating Systems-Synchronization Mechanisms-Concept of a Process-Concurrent Processes-The Critical Section Problem-Process Deadlocks-Models of Deadlocks-Models of Resources-A Graph-Theoretic Model of a System State-Necessary and Sufficient Conditions for a Deadlock-Systems with Single-Unit Requests-System with only Consumable Resources-Systems with only Reusable Resources.

UNIT-II : DISTRIBUTED OPERATING SYSTEMS

Architectures of Distributed Systems-Introduction-Motivations-System Architecture Types-Distributed Operating Systems-Issues in Distributed Operating Systems-Communication Networks-Communication Primitives-Distributed Mutual Exclusion-The Classification of Mutual Exclusion Algorithms-A simple Solution to Distributed Mutual Exclusion-Lamport's Algorithm-The Ricart-Agrawala Algorithm-Maekawas's Algorithm-Distributed Deadlock Detection-Preliminaries-Deadlock Handling Strategies in Distributed System-Issues in Deadlock Detection and Resolution.

UNIT-III :DISTRIBUTED RESOURCE MANAGEMENT

Distributed File Systems-Introduction-Architecture-Mechanisms for BuildingDistributed File Systems-Design Issues-Distributed Shared Memory-Algorithms for Implementing DSM-Memory Coherence-Distributed Scheduling-Issues in Load Distributing-Failure Recovery and Fault Tolerance-Recovery-Fault Tolerance-Issues-Atomic Actions and Committing-Commit Protocols-Voting Protocols.

UNIT-IV : PROTECTION AND SECURITY

Resource Security and Protection-Preliminaries-The Access Matrix Model-Implementation of Access Matrix-Advanced Model of Protection-The UNIX Operating Systems -Data Security Cryptography-A Model of Cryptography-Conventional Cryptography-Modern Cryptography-Private Key Cryptography-Public Key Cryptography-Multiprocessor Operating Systems-Multi Processor System Architectures-Motivation for Multiprocessor Systems-Multiprocessor Operating Systems-Multiprocessor

UNIT-V DATABASE OPERATING SYSTEMS

Requirements of a Database Operating-Concurrency Control-Database Systems-A Concurrency Control Model of Database Systems-The Problem of Concurrency Control-Serializability Theory-Distributed Database Systems-Concurrency Control Algorithms-Basic Synchronization Primitives-Lock Based Algorithms-Timestamp Based Algorithms-Optimistic Algorithms-Concurrency Control Algorithms. Total no. of hrs: 45 Hrs TEXTBOOKS :

1. MukeshSinghal, Niranjan G. Shivaratri-"Advanced Concepts in Operating Systems", McGraw Hill Education, Chennai , 2017.

REFERENCE BOOKS :

- 1. LeLann,G, Distributed Systems-Towards a Formal Approach,"Information Processing77,1977.
- 2. Agrawal,D and A.E. Abbadi,"The Generalized Tree Quorum Protocol:An Efficient Approach for Managing Replicated Data", ACM Trans on Database Systems, 1992.

9hrs

9hrs

9hrs

9hrs

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9hrs



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20E0XX	Elective-1	Ту	3	3	0	0

Choose any one of the subject in the following table

	Elective 1											
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С					
1	MCS20E001	Advanced Computer Network	Ту	3	0	0	3					
2	MCS20E002	Network Security And Cryptography	Ту	3	0	0	3					
3	MCS20E003	Advanced Data Science	Ту	3	0	0	3					



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20E0XX	Elective-2	Ту	3	3	0	0

Choose any one of the subject in the following table

	Elective 2												
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С						
1	MCS20E004	Introduction To Intelligent System	Ту	3	0	0	3						
2	MCS20E005	Advanced Computer Architecture	Ту	3	0	0	3						
3	MCS20E006	Grid And Cloud Computing	Ту	3	0	0	3						



Subject C MET20R	Code: RM01	Sul R	oject Na esearch	me : Metho	odology	and I	PR	Ty/ ET	Lb/ TL	L	T/SL	r P/R	C
		Pre	requisi	te: cor	e subje	cts		Т	y	2	0	0	2
Ty/Lb/:	Theor	y/Lab	L:Leo	cture 7	Γ: Tuto	rial	$\mathbf{P}:\mathbf{P}$	ractic	al/Pr	oject	R : Rese	earch C	:
Credits T	T/L Th	eory/	Lab							-			
OBJECT	TVE:	The g	oal is to	empha	asize the	e impor	tance	e of ini	novat	ion and	d creativi	ity by	
understan	ding th	ne rese	arch co	ncepts	and eth	ics whi	ich w	ill aid	to bu	ild the	nation I	PR statu	lS.
COURSE	E OUI	COM	ES (CC	<u>) : By</u>	y doing	this co	urse	stude	nts w	vill			
CO1	Un inf	dersta ormati	nd resea on and i	rch pro ts exec	oblem for oution by	ormulat y follov	ion b ving	y Ana resear	lyzin ch eth	g resenics	arch rela	ted	
CO2	Un Teo	dersta chnolo	nd that t gy, but	oday's tomorr	world i ow worl	s contr ld will	olled be ru	by Co led by	omput ideas	ter, Inf s, conc	ormatior ept, and	n creativit	y.
CO3	Un	dersta	nding th	at whe	n IPR w	ould ta	ıke sı	ich im	porta	nt plac	e in grov	wth of	
	ind	ividua	ls & nat	ion, it	is needl	ess to e	emph	asis th	e nee	d of in	formatio	n about	
	Int	ellectu	al Prope	erty Rig	ght to be	e prom	oted a	among	stud	ents in	general	&	
	eng	gineeri	ng in pa	rticula	r.							6 1	
CO4	Un	dersta	nd that I	PR pro	otection	provid	es an	incen	tive to	o inver	tors for	further	
	res	earch	work and ducts a	nd in t	urn brin	$\sigma s abo$	D, WI	onomi	aus to	wth an	on of ne	w and benefits	
Manning	Monning of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7		08	<u>P</u>	09	PO10	
CO1	2	3	3	3	3	2	3		3		2	2	
CO2	2	3	3	3	3	2	3		3		2	2	
CO3	2	3	3	3	3	2	3		3		2	2	
CO4	2	3	3	3	3	2	3		3		2	2	
COs/	PSO1									PSO2			
PSOs CO1	3									3			
CO2	3									3			
CO3	3									3			
CO4	3									3			
3/2/1 ind	icates	Stren	gth of (Correla	ation	3- Hig	h, 2-	Med	ium,	1-Lov	V		
				s	ves		ect		ili				
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Category	y	<u>ring</u>	ties	C	E	ecti	1/F	hsh	ical ''	IIS			
		c Sc nee	ani	al N	ram	E	ica	lter	chn	<u>SKI</u>			
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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MET20RM01	Research Methodology and IPR	Ту	2	0	0	2

UNIT 1:SELECTION, ANALYSIS AND STATEMENT OF THE RESEARCH PROBLEM; 6 hrs

Literature Review and Formulation of Objectives - using the following Critical thinking Skills - Drawing a Concept map, Oral Communication, Debating, Questioning, Collaborating, Evaluation and Reasoning.

UNIT 2 : RESEARCH DESIGN

Types of Study, Types of Data, Measures of Variablility, Setting up the Hypotheses, data collection techniques and tools, sampling, Describing data – Charts and graphs : Data processing – Categorization, coding, summarization

UNIT 3: DATA ANALYSIS AND REPORT WRITING:

Statisticalmeasures, Regression and correlation, significance test; Report writing - Purpose, format, content, editing and evaluation. Using Citation tools; Report for specific purposes - Theses, Journals, Grant application. Oral presentation to an audience; use of project management digital tools and plagiarism checking.

UNIT 4 :INTRODUCTION TO INTELLECTUAL PROPERTY

Types of intellectual property rights - Patent, Copyright, Trade Mark, Industrial Design, Geographical Indication, Trade Secrets - Traditional Knowledge. Elements of Patentability - Novelty, Non Obviousness (Inventive Steps), Industrial Application - Non patentable inventions - Process of patenting - National and International – Form and Fees for IP India

UNIT 5:PRIOR ART SEARCH, PATENT DRAFTING

Drafting patent Claims - Types of claims - Registration Procedure, Rights and Duties of Patentee; Patent infringement; Licensing - Franchising - Joint ventures; Non-Disclosure Agreements (NDAs) - Material Transfer Agreements (MTAs).

Total Number of Hours: 30

References:

- ◆ C. Vijayalakshmi and C. Sivapragasam (2011) Research Methods Tips and Techniques, , MJP **Publishers**
- Deboraj Rumsey (2010) Statistics Essentials for Dummies, Wiley Publishing Incorporated
- Bouchoux (2013) Intellectual Property, DELMAR CENGAGE Learning, USA
- V K Ahuja (2017) Law Relating to Intellectual Property Rights, LexisNexis Butterworths India

IMPORTANT WEB LINKS

- https://www.wipo.int/portal/en/index.html
- http://ipindia.nic.in/
- https://www.epo.org
- https://www.uspto.gov

6 hrs

6 hrs

6 hrs

6 hrs



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MET20AUXX	Audit Course I	Ту	2	0	0	0

Choose any one of the subject in the following table

	Audit course I&II										
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С				
1	MET20AU01	English for Research Paper Writing	Ту	2	0	0	0				
2	MET20AU02	Disaster Management	Ту	2	0	0	0				
3	MET20AU03	Sanskrit for Technical Knowledge	Ту	2	0	0	0				
4	MET20AU04	Value Education	Ту	2	0	0	0				
5	MET20AU05	Constitution of India	Ту	2	0	0	0				
6	MET20AU06	Pedagogy Studies	Ту	2	0	0	0				
7	MET20AU07	Stress Management by Yoga	Ту	2	0	0	0				
8	MET20AU08	Personality Development through life Enlightenment Skills	Ty	2	0	0	0				



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M.TECH –COMPUTER SCIENCE AND ENGINEERING REGULATION – 2020



Subject	Code :	Subjec	t Name	e:					Tv/Lb		Т/		G
MCS200	L01	Advor			time	Cristan	- 1-h		/ETL	L	SLr	P/R	C
		Advan		pera	iting	System	n lab		T L	0	0	1	2
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T/I /FTI	· Theory	/Lab/Fr	1 . Supe nbedde	d The	eory a	unnig r and Lab	. Floje	сι к.	Researc	л с.	Cleans		
		/ Lao / Li	nocuuc	u III	corya								
OBJEC	TIVES :			ما ما	a af f:	+ o yo : o +							
	earn sneil p	rogrammi	ng and i	the us		iters in t	ne UNIX	cenviro	onment				
	learn to use	system ta	ustom r	ugn C olator	, progr d syste	ann calls							
	 To gain knowledge of process creation and communication between processes. 												
 To learn how process synchronization can be done using semaphores. 													
COURSE OUTCOMES (Cos) -													
Students	completir	ig the cou	rse wei	re abl	le to								
Students completing the course were able to													
CO1	1 Excel functions, structures and history of operating systems												
CO2	Learn understanding of design issues associated with operating systems												
CO3	Master va	arious pro	cess m	anage	ement	concep	ts inclu	ding s	cheduli	ng, sy	nchroniz	ation,	
deadlocks and multithreading													
CO4	Master co	oncepts of	f memo	ry ma	anage	ment in	cluding	y virtua	al memo	ry			
CO5	Understa	nd issues	related	to fil	le syst	em inte	rface an	nd imp	lementa	tion,	disk mar	nageme	nt
Mappin	g of Cour	se Outco	mes wi	th Pr	ograi	m Outc	omes (l	POs)					
COs/POs	5 PO1	PO2	PO3	P	O 4	PO5	PO6	PO'	7 P	08	PO9	P	D10
CO1	1	2	2		3	1	2	2		2	1		2
CO2	2	2	1		1	2	2	1		3	3		3
CO3	3	1	2		3	3	2	2		2	1		2
CO4	2	2	1		3	1	3	3		2	3		3
CO5	3	1	2		3	3	2	2		2	1		2
COs/PSC)s					PSO	1				PSO2		
CO1						2					1		
CO2						1					2		
CO3						2					1		
CO4	O4 2 1												
CO5	1 1		1			2	г – т				1		
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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CL01	Advanced Operating System Lab	Lb	0	0	4	2

- 1. Remote Method Invocation
- 2. Develop the RMI Client and Server.
- 3. Develop of a Simple Banking System.
- 4. Implementation of CPU Scheduling Algorithms (FCFS, SJF, RR, Priority).
- 5. Implementation of Page Replacement Algorithms (LRU, OPT, FIFO).
- 6. Implementation of memory allocation algorithms (First Fit, Best Fit, Worst Fit)
- 7. Implement the Producer Consumer problem using semaphores.
- 8. Simulation of Shared Memory Concept.
- 9. Implementation of bankers Algorithm.
- 10. Implementation Disk Scheduling Algorithms
- 11. Developing Application using Inter Process communication (using shared memory, pipes or message queues)
- 12. Implement the Producer Consumer problem using semaphores (using UNIX system calls).
- 13. Implement some memory management schemes I
- 14. Implement some memory management schemes II
- 15. Implement any file allocation technique (Linked, Indexed or Contiguous)
- 16. Write a C program to simulate producer-consumer problem using semaphores
- 17. Write a C program to simulate the concept of Dining-Philosophers problem.



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20ELXX	Elective-1 lab	Lb	0	0	4	2

Choose any one of the subject in the following table

	Elective I Lab										
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С				
L1	MCS20EL01	Advanced Computer Network Lab	Lb	0	0	4	2				
L2	MCS20EL02	Network Security And Cryptography Lab	Lb	0	0	4	2				
L3	MCS20EL03	Advanced Data Science Lab	Lb	0	0	4	2				



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Subject MCS20	Code : C002	Subjec	t Name :	Advance	ed Algor	ithms		y/Lb/ ETL	L	T/S Lr	P/R	С
		Prerequ	isite :					Ту	3	0	0	3
L : Lect	ure T : Tute	orial S.L	r : Super	vised Lea	rning P	: Project	R : Res	earch	C: Cı	redits		
T/L/ETI	: Theory	/ Lab / Ei	mbedded	Theory a	nd Lab							
OBJEC	TIVES :											
• To s	study variou	s graph pi	rocessing	algorithms	s and Alg	orithm De	sign tech	niques				
Able	e to implem	ent Quick	sort ,Mer	rge sort alg	gorithm,	BFS and D	FS algori [.]	thms				
Able	e to implem	ent backt	racking al	gorithm fo	or the N-o	queens pro	blem.					
Abl	e to implem	ient greed	dy algorith	nm for job	sequenc	ing with de	eadlines.	_				
	COURSE OUTCOMES (Cos) -											
Students completing the course were able to												
CO1	analyze th	e perform	nance of a	lgorithms.	Ability	to choose a	appropri	ate alg	orithr	n desig	n	
	techniques for solving problems.											
CO2	understand the variations among tractable and intractable problems.											
<u> </u>												
003	10 clear t	ip trouble divide a	es the usa	ige of set	of rules	design m	ethous 1 g and b	nciuai acktra	ng the	e grasp	oing	
COA	approach,								CKIIIg	5		
CO4	10 unders	stand the	variation	is among	tractable	e and intra	ictable p	brobler	ns.			
CO5	to choose	appropri	ate algor	ithm desi	gn techr	iques for	solving	proble	ems.			
Mappin	g of Cours	se Outco	mes witł	n Progran	n Outco	omes (PO	s)					
COs/PC	Os PO1	PO2	PO3	PO4	PO5	PO6	PO7	Р	P	09	PO1	0
001		•	1	1	2	•	1	08		2	2	
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	3	1	2	3	3	2	2	2		1	2	
	1	2		3								
CO4		2	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									
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CO5		2 1	1 2	1 3	2 3	2 2 2	2 1 2	2 3 2		$\frac{1}{3}$	2 3 2	
CO5 COs/PS	2 3 SOs	2 1	1 2	1 3	2 3 PSO	2 2 2 1	2 1 2	2 3 2	I	1 3 1 PSO2	2 3 2	
CO5 COs/PS CO1 CO2	2 3 SOs	2 1	1 2	1 3	2 3 PSO 2 2	2 2 2 1		2 3 2		I I 3 1 PSO2 1 1 1	3 2	
CO5 COs/PS CO1 CO2 CO3	2 3 SOs	2 1	1 2	1 3	2 3 PSO 2 2 1	2 2 2 1		2 3 2	I	I I 3 1 PSO2 1 1 2	<u> </u>	
CO5 COs/P3 CO1 CO2 CO3 CO4	2 3 SOs	2 1	1 2	1 3	2 3 PSO 2 2 1 2	2 2 1		2 3 2	I	I I 3 I PSO2 I 1 2 1 1	<u>3</u> 2	
CO5 COs/PS CO1 CO2 CO3 CO4 CO5	2 3 SOs	2 1	1 2	1 3	2 3 PSO 2 2 1 2 1 2 1	2 2 1			I	I I 3 I PSO2 I 1 I 2 I 1 2 1 2	2 3 2	
CO5 COs/P3 CO1 CO2 CO3 CO4 CO5	2 3 SOs	2 1	1 2	1 3	2 3 PSO 2 2 1 2 1 2 1	2 2 1		2 3 2]	I I 3 1 PSO2 1 1 2 1 2 1 2 1 2	2 3 2	
CO5 COs/PS CO1 CO2 CO3 CO4 CO5	2 3 SOs	2 1	1 2 %	1 3	2 3 PSO 2 2 1 2 1	2 2 1				I I 3 1 PSO2 1 1 2 1 2 1 2 1 2		
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Cos/PS CO1 CO2 CO3 CO4 CO5	2 3 SOs	2 1	Humanities & Social	Logram core	2 3 PSO 2 2 1 2 1	Program The contract of the c	2 1 2 Electives	Practical / 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	I	Internships 1 3 1 0 1 2 1 2 1 2 1 2 1 2 1 2 1 2	Skills	
CO5 CO3 CO4 CO5 CO4 CO5	2 3 SOs Basic Sciences	2 1	Humanities & Social	Program core	2 3 PSO 2 2 1 2 1	Program T T T T T T T T T T T T T	2 1 2 Electives	Practical / 2 2 2 Project		Internships / In	Skills	



Subject Code	Subject Name	Ty/Lb/ ETL	L	T/SLr	P/R	С
MCS20C002	Advanced Algorithms	Ту	3	0	0	3

UNIT-II

Sorting: Review of various sorting algorithms, topological sorting,

Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edgeweighted case (Dijkasra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

UNIT-II

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path. 9 hrs

UNIT-III

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

UNIT-IV

Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.

Representation of integers/polynomials: Chinese Remainder Theorem. Modulo Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm

UNIT-V

Linear Programming: Geometry of the feasibility region and Simplex algorithm

NP-completeness: Examples, proof of NP-hardness and NP-completeness.

Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm. Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures

Total Hrs:45 hrs

References Books

1. "Introduction to Algorithms", Cormen, Leiserson, Rivest, Stein, 4th edition, McGraw Hill,

2. "The Design and Analysis of Computer Algorithms" Aho, Hopcroft, Ullman.

3. "Algorithm Design" Kleinberg and Tardos.

9 hrs

9 hrs

9 hrs

9 hrs



Subject MCS200	Cod 2003	e :	Subje	et Name	e : Soft	Comp	uting			Ty/ Lb/ ETL	L	T/S Lr	P/R	С
			Prereq	uisite :						Ту	3	0	0	3
L : Lectu	ure T	: Tuto	rial S.L	r : Supe	rvised	Learni	ng P : F	Proje	ect R :	Research	n C: (Credits		
T/L/ETI	∠ : Tł	heory /	Lab / Ei	nbedde	d Theor	ry and	Lab							
OBJEC	TIV	ES :												
Dev	elop t	the skills	s to gain	a basic u	underst	anding	of neura	al ne	etwork t	heory and	d fuzzy	logic tl	heory.	
• Intr	oduc	e stude	nts to ar	lincial ne	eurai ne	lworks	and iuz	zy tr	leory in	om an en	gineer	ing per	spective	2
COURS	E O	UTCO	MES (O	Cos):										
Students	s com	pleting	the cou	irse wer	e able t	0								
CO1	Cor	nprehei	nd the fi	ızzy log	ic and	the cor	ncept of	f fuz	ziness	involved	l in va	rious s	vstems	and
001	fuzz	zy set th	neory.	"22 J 10 E	,		pr of					10055	jerrine	
CO2	Unc	lerstand	the contract	ncepts o	of fuzzy	y sets, k	nowled	lge	represe	ntation u	ising f	uzzy ri	ules,	
CO3	To	underst	and the	fundam	ZZY IIII ental th	erence peory a	nd con	s, al	s of ner	y logic iral netw	vorks	Identif	v diffe	rent
005	neu	ral netv	vork arc	hitectur	es, algo	orithms	s, appli	catio	ons and	their lin	nitatio	ns	y unici	Cint
CO4 Understand appropriate learning rules for each of the architectures and learn several neural														
network paradigms and its applications														
CO5	Rev	eal diff	erent ap	plicatio	ons of t	hese m	odels to	o so	lve eng	ineering	and o	ther pr	oblems	
Mappin	g of	Course	Outco	mes wit	h Prog	gram (Outcom	es ((POs)					
COs/PO	s	PO1	PO2	PO3	PO4	PO5	PO6	I	PO7	PO8	P) 9	PO	10
CO1		3	1	2	3	3	2		2	2	-	1	2	
CO2		1	2	2	3	1	2		2	2	-	1	2	
CO3		2	2	1	1	2	2		1	3		3	3	
CO4		3	3	3	1	1	2		2	2		2	1	
CO5		1	2	3	1	2	3		1	2		3	2	
COs/PS	Os					I	PSO1					PSO ₂		
CO1							2					1		
CO2							$\frac{2}{2}$					1		
CO3							2					1		
C04							1					$\frac{2}{2}$		
05							1					2		
λ	ciences		ciences	ities & Sciences			n es		lectives	al /		nips / cal Skills		ills
Catego	Basic S		Engg S	Human Social S	Progran Progran Elective Open E				Practice	Project	Internsl Technic		Soft Sk	



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20C003	Soft Computing	Ту	3	0	0	3

Unit 1

9 hrs **INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS:** Evolution ofComputing: Soft Computing Constituents. From Conventional AI to ComputationalIntelligence: Machine Learning Basics

Unit 2

FUZZY LOGIC: Fuzzy Sets, Operations on Fuzzy Sets. Fuzzy Relations. MembershipFunctions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, FuzzyExpert Systems, Fuzzy Decision Making.

Unit 3

NEURAL NETWORKS: Machine Learning Using Neural Network, AdaptiveNetworks, Feed forward Networks, Supervised Learning Neural Networks, RadialBasis Function Networks: Reinforcement Learning, Unsupervised Learning NeuralNetworks, Adaptive Resonance architectures. Advances in Neural networks

Unit 4

GENETIC ALGORITHMS: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition.

Unit 5

Matlab/Python Lib: Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic

Total Hrs:45 hrs

References Books

1. Jyh:Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, Neuro:Fuzzy and Soft Computing, Prentice: Hall of India, 2016.

2. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall, 2018.

3. MATLAB Toolkit Manual

9 hrs

9 hrs

9 hrs

9 hrs



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20EXX	Elective-3	Ту	3	0	0	3

Choose any one of the subject in the following table

Elective - 3							
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С
1	MCS20E007	Computer Vision	Ту	3	0	0	3
2	MCS20E008	Human Computer Interaction	Ту	3	0	0	3
3	MCS20E009	Natural Language Processing	Ту	3	0	0	3



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20EXX	Elective-4	Ту	3	0	0	3

Choose any one of the subject in the following table

	Elective - 4										
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С				
1	MCS20E010	Data Preparation And Analysis	Ту	3	0	0	3				
L1	MCS20EL10	Data Preparation And Analysis Lab	Lb	0	0	4	2				
2	MCS20E011	Formal Language And Automata Theory	Ту	3	0	0	3				
L2	MCS20EL11	Formal Language And Automata Theory Lab	Lb	0	0	4	2				
3	MCS20E012	Digital Forensics And Investigation	Ту	3	0	0	3				
L3	MCS20EL12	Digital Forensics Investigation Lab	Lb	0	0	4	2				



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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MET20AUXX	Audit Course II	Ту	2	0	0	0

Choose any one of the subject in the following table

	Audit Course I & II									
S.No	Sub.Code	Title of Subject	TY /LB/ETL	L	Т	Р	С			
1	MET20AU01	English for Research Paper Writing	Ту	2	0	0	0			
2	MET20AU02	Disaster Management	Ту	2	0	0	0			
3	MET20AU03	Sanskrit for Technical Knowledge	Ту	2	0	0	0			
4	MET20AU04	Value Education	Ту	2	0	0	0			
5	MET20AU05	Constitution of India	Ту	2	0	0	0			
6	MET20AU06	Pedagogy Studies	Ту	2	0	0	0			
7	MET20AU07	Stress Management by Yoga	Ту	2	0	0	0			
8	MET20AU08	Personality Development through life Enlightenment Skills	Ту	2	0	0	0			



Subject MCS200	Subject Code : MCS20CL02 Subject Na				ne : Advanced Algorithms lab					Ty/ Lb/ ETL	L	T/S Lr	P/R	С
		Prerequ	isite :							Lb	0	0	4	2
L : Lectu	are T : Tut	orial S.L	r : Supe	ervised	Learni	ng P : l	Proje	ect]	R : R	lesearc	h C: C	Credits		
T/L/ETI	L: Theory	/ Lab / E	mbedde	d Theo	ory and	Lab								
OBJECTIVES :														
 Teach the student the fundamental algorithms . Teach the student how to analyze the performance of algorithms 														
COURS	COURSE OUTCOMES (Cos) :													
Students	completir	ng the cou	irse wei	re able	to									
C01	Compreh	end how	to desig	gn algo	rithms	hat emj	ploy	var	ious	strateg	gy.			
CO2	CO2 solve problems using fundamental graph algorithms.													
CO3 To analyze the average-case running times of randomized algorithms, and recite algorithms that employ randomization.														
Mappin	g of Cour	se Outco	mes wi	th Pro	gram (Outcon	ies (POs	s)					
COs/POs	s PO1	PO2	PO3	PO4	PO5	PO6	PO	07	PO	8	PC)9	PO10	
CO1	3	1	2	3	1	1		2		2	2	2	2	2
CO2	2	2	1	1	3	3		3		1	2	2	2	
CO3	1	2	3	2	2	2	1	1		1	3	6	1	
COs/PS	Os					PSO1						PSO2		
CO1						2						1		
CO2						1						2		
CO3			1			2		r				1		
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences		Program core	Program Electives		Open Electives	1	Project		Internships / Technical Skills		Soft Skills
							~							



Subject Code	Subject Name	Ty/Lb /ETL	L	T/S Lr	P/R	С
MCS20CL02	Advanced Algorithms lab	Lb	0	0	4	2

List of Experiments:

- 1. Summary/recap on complexity and NP-complete problems.
- 2. Dynamic programming: characterization, diverse problems.
- 3. Greedy algorithms: characterization, diverse problems.
- 4. Methods for solving NP-complete problems (branch and bound, graph exploration,

heuristics based greedy/random/optimization approaches)



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Please Turn Over


Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20ELXX	Elective-4 lab	Lb	0	0	4	2

Choose any one of the subject in the following table

	Elective 4-lab											
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С					
L1	MCS20EL10	Data Preparation And Analysis Lab	Lb	0	0	4	2					
L2	MCS20EL11	Formal Language And Automata Theory Lab	Lb	0	0	4	2					
L3	MCS20EL12	Digital Forensics Investigation Lab	Lb	0	0	4	2					



Subject MCS200	Code : CL03	Subject with Se	t Name minar	: Mi	ini Pro	oject	Ty/Lb)/ETI		L	T/S Lr	P/ R	С
		Prerequ	isite :				L	b		2	0	0	2
L : Lectu T/L/ETL	re T : Tut : Theory	orial S.L. / Lab / Er	r : Supe nbeddec	rvise l The	ed Lea eory a	urning Paund Lab	Project R	: Res	searc	h C: Cı	redits		
OBJEC	TIVES :												
• To a prot	cquire hand otype invol	ds-on expe ving multi	erience in -disciplir	n con nary s	vertin skills a	ig a novel ind / or kr	idea / techi nowledge ar	nique nd wo	into a rking	a workin in at tea	g mode ım.	el /	
COURS	COURSE OUTCOMES (Cos) :												
Students completing the course were able to													
CO1	To conce	ptualize a	novel i	dea /	/ techi	nique int	o a product						
CO2	2 To develop a multi-disciplinary thinking and enable teamwork												
CO3 Ideate and develop a prototype													
Mappin	g of Cour	se Outco	mes wit	h Pr	ograi	m Outco	mes (POs)						
COs/PO	s PO1	PO2	PO3	P	04	PO5	PO6	PO)7	PO8	PO	9	PO10
CO1	3	1	1		2	2	3	1	L	2	3		3
CO2	2	1	2		2	1	1	3	3	3	2		1
CO3	2	2	2		1	1	2	1		3	3		2
COs/PS0	Os					PSO	1				PSO2		
CO1						2					1		
CO2						1					2		
CO3	· · · · · ·					1					2		1
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences		Program core		Program Electives	Open Electives Practical / Project Internships / Technical Skills					Soft Skills



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CL03	Mini project with Seminar	Lb	2	0	0	2

1 Find your domain of interest and perform an in depth study on the articles of your domain.

2 Analyze and categorize executable project modules after considering risks.

3 Choose efficient tools for designing project modules.

4 Combine all the modules through effective work after efficient testing.

5 Elaborate the completed task and compile the project report and PPT slides



Semester 3

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20EXX	Elective-5	Ту	3	0	0	3

Choose any one of the subject in the following table

		Elective 5					
S.No	Sub.Code	Title of Subject	Ty/Lb/ ETL	L	Т	Р	С
1	MCS20E013	Internet Of Things	Ту	3	0	0	3
2	MCS20E014	Cloud Computing	Ту	3	0	0	3
3	MCS20E015	Game Theory	Ту	3	0	0	3



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MET20OEXX	Open Elective	Ту	3	0	0	3

Choose any one of the subject in the following table

	Open Electives											
S.No	Sub.Code	Title of Subject	TY /LB/ETL	L	Т	Р	С					
1	MET20OE01	Business Analytics	Ту	3	0	0	3					
2	MET20OE02	Industrial Safety	Ту	3	0	0	3					
3	MET20OE03	Operations Research	Ту	3	0	0	3					
4	MET20OE04	Cost Management of Engineering Projects	Ту	3	0	0	3					
5	MET20OE05	Composite Materials	Ту	3	0	0	3					
6	MET20OE06	Waste to Energy	Ту	3	0	0	3					



Subject MCS200	Code : CL04	Subject Na	ame : Dis	ssertation	-I	Ty/I	b/ETL	L	T/S Lr	P/ R	С
		Prerequisit Seminar	e : Mini I	Project w	ith		Lb	0	0	20	10
L : Lectu T/L/ETI	ure T : Tuto	orial S.Lr : S / Lab / Embe	Supervise dded The	d Learnir ory and l	ng P : Pro Lab	oject R	: Researc	ch C: C	redits		
OBJEC • The expl facu and and	TIVES : objective o lore a proble ilty mentor. skills acquin creatively,	f the Main Pro em or issue , a The project d red to real-wo find an optima	oject is to address th emonstra orld issues al solution	culminate rough foc tes the str and prob , make et	the acad used and udent's al ems. This hical deci	emic stu applied bility to project sions an	idy and pi research synthesize affirms tl d to prese	rovide ar under th e and app ne studer ent effec	opport e direct oly the l nts to th tively.	tunity tion of knowl hink cr	to a edge ritically
COURS Students	SE OUTCO	DMES (Cos) g the course	were able	e to							
CO1	Apply the problem of	knowledge or issue.	and skills	s acquired	1 in the c	ourse o	f study a	ddressin	g a spe	cific	
CO2	To encou user frien	rage students	s to think hable solu	critically ations	and crea	atively a	about soc	eietal iss	ues and	l deve	elop
CO3	CO3 To refine research skills and demonstrate their proficiency in communication skills.										
CO4	To take o talents.	n the challen	ges of tea	amwork,	prepare a	a presen	tation an	d demoi	nstrate	the in	inate
Mappin	g of Cours	e Outcomes	with Pro	ogram O	utcome	s (POs)			I		
COs/PC	os PO	1 PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9)]	PO10
CO1	3	1	2	3	1	1	2	2	2		2
CO2	2	2			3	3	3	1 1	2		2
CO3	1		3	2	<u> </u>	 1	1	1	<u> </u>		$\frac{1}{2}$
		1			1 PSO1	1	2	4	PS02		2
CO1	05				2				1		
CO2											
CO3					2				1		
CO4			_ _		2				1		
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core Program Electives Open Electives Practical / Project Project Technical Skills Soft Skills					Soft Skills		



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CL04	Dissertation-I	Lb	0	0	20	10

- Find your domain of interest and perform an in depth study on the articles of the domain.
- Obtain updated knowledge through Literature Survey in reputed Journals
- Review and finalize the title by various approaches. The title should reflect problem identification, domain name, technology applied etc.
- Review and finalize the approach to the problem identified.
- Prepare a detailed action for conducting investigation including team work.
- Perform detailed Analysis / Modeling / Simulations / Design / Problem solving / Experiments as needed.
- Categorize executable project modules after considering risks and choose efficient tools for designing project modules.
- Elaborate the completed task and compile the work in PPT slides



Subject	Code :	S	ubject Na	ame : Diss	sertation	-II		Ty/Lb ETL	/ L	T/S Lr	P/ R	С	
	CLUC	P	rerequisite	e : Project	Phase I			Lb	0	0	32	16	
L : Lectu	ure T : '	Tutoria	1 S.Lr : S	upervised	l Learnir	ng P : Pr	oject R	: Resea	rch C: C	Credits			
T/L/ETI	: Theo	ory / La	ab / Embe	dded The	ory and I	Lab	5						
OBJEC	TIVES	:											
• The	objectiv	ve of th	e Main Pro	ject is to c	ulminate	e the acad	demic stu	idy and p	provide a	n oppo	rtunit	y to	
expl	ore a pr	roblem	or issue , a	ddress thr	ough foc	used and	applied	research	n under th	ne direo	ction o	ofa	
facu	lty men	itor. The	e project d	emonstrat	es the st	udent's a	bility to	synthesi	ze and ap	ply the	know	/ledge	
criti	skills du cally an	.quireu d creati	vely find a	nu issues a an ontimal	solution	make et	s project bical dec	allinis risions ar	ne slude	ent off	ective	alv	
COURS	COURSE OUTCOMES (Cos) :												
Students	Students completing the course were able to												
CO1	CO1 Apply the knowledge and skills acquired in the course of study addressing a specific												
~ ~ ~	proble	em or is	ssue										
CO2	2 To encourage students to think critically and creatively about societal issues and develop												
<u>CO3</u>	User II	riendly	and reach	hable solu	tions	a thair n	roficion	n in aa	mmunia	tion of	z :11 a		
COS	To terme research skins and demonstrate their proficiency in communication skins												
<u> </u>	To tal			~~~ of too					ad damaa		41.0		
C04	10 tak		le chanen	ges of tea	mwork,	prepare	a presen	tation a	na aemo	nstrate	e the I	innate	
Mannin		, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Jutcomes	with Pro	aram (hitcome	e (POe)						
		$\frac{1}{PO1}$	PO2	PO3		PO5	PO6	PO7	PO	8 P	09	PO10	
CO1	6	3	1	2	3	1 30	1 1	201	2		2	2	
CO^2		$\frac{3}{2}$	2	1		3	3	3	1		2	2	
CO2 CO3		$\frac{2}{3}$	1	2	3	1	1	2	2		2 2	2	
CO4		2	2	1	1	3	3	3	1		2	2	
COs/PS	Os				I	PSO1				PSO2			
CO1						2				1			
CO2						1				2			
CO3						2				1			
CO4	<u>r</u>		1			1				2			
	SS		S	c ses				es		;11e	e III		
	ence		snce	enc	COLE			ctiv		S/ S		~	
ory	Scie		Scie	nitic Sci	m e		m /es	Elec	t t	hip	L C G I	kill	
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Cat	Bas		Enį	Hui Soc	Pro		Pro Ele Pro Tec			51	Sof		
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Semester 4

Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MCS20CL05	Dissertation-II	Lb	0	0	32	16

- Review detailed Analysis / Modeling / Simulations / Design / Problem solving / Experiments as needed.
- Finalize executable project modules after considering risks and efficient tools for designing project modules.
- Combine all the modules through effective team work after efficient testing.
- Develop a final product / process, perform efficient Testing, arrive optimized results and conclusions and suggest future directions.
- Prepare a paper for Conference Presentation and Journal Publication and get review comments.
- Elaborate the completed task, compile the work in PPT slides and create a Project Report in the standard format.



Subject MCS200	Code : CE01	: S	ubject Name : Advanced omputer network				Ty/L	b/ETL	L	T/SL r	P/ R	С
1100200		F	Prerequisite :	Comput	er Netw	vorks		Γv	3	0	0	3
L : Lectu	ure T :	Tutori	al S.Lr : Sup	pervised	Learnir	ng P : Pro	pject R	Researc	ch C:	Credit	s	-
T/L/ETI	: The	ory / L	ab / Embedd	ed Theor	ry and I	Lab	5					
OBJEC	TIVES	5:										
• To	study t	he pro	blematic of	service ir	ntegratio	on in TC	P/IP net	works fo	cusing	on pr	otocol	design,
impl	ementa	tion an	d performanc	e issues;								
• To c	debate t	he curi	ent trends and	d leading	researc	h in the c	omputer	networki	ng area	а.		
COURS	F OU	TCON	IFS (Cos) -									
Students	compl	eting f	the course w	ere able i	to							
Students	comp	leting			.0							
CO1	to ider	ntify an	d discuss the	concepts	underly	ing IPv6	protocol,	and their	main o	charact	eristics	and
CO2	to exp	lain an	d exemplify cu	urrent Qo	S archite	ectures a	nd mecha	anisms, a	nd the	QoS s	upport	
CO 2	challe	nges in	future netwoi	rks; omont icc	une and	dovico o	doquato	notwork r		omont	colutio	00
003		uss rei	evant manage		ues anu	uevise a	uequale		папау	emeni	Solutio	115
GOA	40.000		d and anniala	44	. :							-l
CO4	to und servic	erstand es requ	irements;	the desig	n issues	s in transp	ort servi	ces in fac	e or ap	oplicatio	ons and	a
CO5	to ider	ntify an	d assess poss	sible rese	arch opp	ortunitie	s and diff	iculties w	ithin th	e cours	se sco	be.
Mappin	g of C	ourse	Outcomes w	vith Prog	gram O	utcome	s (POs)					
COs/PO	s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P	08	PO9	PO10
CO1		3	1	2	3	1	1	2		2	2	2
CO2		2	2	1	1	3	3	3		1	2	2
CO3		1	2	3	3	3	2	2		2	1	1
CO4		3	1	2	3	1	1	2		2	2	2
CO5		2	2	1	1	3	3	3		1	2	2
COs/PS	Os				F	SO1		1		PSO	2	
CO1						2				1		
CO2						1				2		
CO3	2 1											
CO4						2				1		
CO5	ſ					1	1			2		
	s			S				S			IIS	
	lce		lce	s & ince		ore		ive		<u> </u>	N.	
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ate	asi		ngg	lum		rog	rog lec	ipei	roid	iter	ect	oft
	В		Щ	N II		Ч	Р	С	Р	II	_	S
	1			1			1			1		1



Elective 1

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE01	Advanced computer network	Ту	3	0	0	3
T T A · T						

Unit I

Review to Fundamentals of Computer N/Ws, TCP/IP reference model, Interior and Exterior Gateways routing application layered protocols such as DHCP, BOOTP OSI, TCP/IP, ATMX.25, frame relay, switching techniques in communication system.

Unit II

Fundamentals of Optical Networks, SONET/SDH Introduction, TDM Networks elements, Generation of optical N/W's.

Unit III

9 hrs

9 hrs

9 hrs

Introduction to key optical node Organization and key other terms, Cross connect Terminology, brief introduction to TDM and WDM, Evolution of optical system, Key Attributes of optical fiber, Digital

Unit IV

Multiplexing Hierarchy, Characterization of optical fiber, timing and Synchronization. Unit V 9 hrs

Fiber Optic Technologies History, Basic fundamentals Operation, Physical properties, networking elements. Wavelength Division Multiplexing Principle of Operation, CDM/DWDM, and WDM networks elements, Impairments and Compensation in WDM.

Total Hrs :45 hrs

Reference Books

1. Optical Networks Control, BalaRajagopalan, Gerg Bernstein, Debanjansaha.

- 2. Optical Networks and WDM, Walter J. Goralski, McGraw-Hill 2017.
- 3. Computer Networks: A System Approach, Larry L. Peterson, Bruce S. Davie, Morgan Kaufmann.
- 4.WDM Optical Networks: Concepts, Design and Algorithms, C. Siva Ram Murthy, Prentice Hall

9 hrs



Subj Co	ject de	Subject I network I	Name : . Lab	Advanced computer Ty/Lb/E L T/SL r P/R								C
MCS20	CEL1	Prerequis	ite : Net	work lal	0			Lb	0	0	4	2
L : Lect	ure T : 1	Tutorial S	.Lr : Su	pervised	Learn	ing P : F	Project	R : Resear	ch C:	Credits		
T/L/ET	L : Theo	ry / Lab /	Embedd	led Theo	ory and	Lab	0					
OBJEC • Bui • Fan are COURS	CTIVES Id an und niliarize t a. SE OUT	: erstanding he student COMES	g of the fr with the (Cos) -	undamer e basic ta	ntal con xonom	cepts of y and ter	compu minolc	ter networki ogy of the co	ing. mputer	network	king	_
Student	s comple	ting the c	ourse w	ere able	to							
CO1	Unders	tand and e	explain I	Data Cor	mmuni	cations	Systen	n and its con	mpone	nts.		
CO2	Identify	the diffe	rent type	es of net	work d	levices a	and the	eir functions	s within	n a netw	ork	
CO3	Familia assist ii	rity with 1 network	the proto design a	tocols of computer networks, and how they can be used to and implementation.								
CO4	14 Understand and building the skills of subnetting and routing mechanisms.											
Mappir	ng of Co	urse Out	comes w	vith Pro	gram (Outcom	nes (PC	Ds)				
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	PO	7 PO8	POS) P	PO10	
CO1	3	1	2	3	3	2	2	2	1		2	
CO2	1	2	2	3	1	2	2	2	1		2	
CO3	2	2	1	1	2	2	1	3	3		3	
CO4	3	3	3	1	1	2	2	2	2		1	
COs/PSO	Os				PS	501			PS	502		
CO1						2				1		
CO2						1				2		
CO3												
CO4						2				1		
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core		Program Electives	Open Electives	Practical / Project	Internships / Technical Skills		Soft Skills	
								\checkmark				1



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CEL1	Advanced Computer Network Lab	Lb	0	0	4	2

1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands.

2. Configuration of IP addressing for a given scenario for a given set of topologies.

3. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address. 4. Configure, implement and debug the following: Use open source tools for debugging and diagnostics. a. ARP/RARP protocols b. RIP routing protocols c. BGP routing d. OSPF routing protocols e. Static routes (check using netstat)

5. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down. 6. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment.

7. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails.

8. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark.



Subject	Code :	Subject	t Name : N	Name : Network Security andTy/Lb/aphyETL					L	T/SL r	P/ R	C
WIC520C	202	Prerequ	usite · Crv	ntogranhy	7		<u>т</u>	Tv	3	0	0	3
L : Lectu	re T : Tut	orial S.L	r : Supervi	ised Learn	ning P :]	Project	R : Re	esearc	h C: (Credits	Ū	5
T/L/ETL	: Theory	/ Lab / Eı	nbedded T	Theory and	d Lab	5						
OBJEC	FIVES :											
• Und	erstand OS	l security a	architecture	e and class	ical encr	yption te	echniqu	ues. G	ain bas	sic knowl	edge	on
thei	number the	eory.										
• Und	erstand val	rious block	cipher mo	des.	c. ctomo	and diff	oront .		~~			
• unue	erstanus tri	e principle	rity technic	кеу стуріо	systems	, and uni	erenti	nessa	ge			
	E OUTC	OMES ((lues								
Students	completin	on the cou	rse were a	ble to								
2000000	••••••											
CO1	To identi	fy the ma	jor types o	of threats t	o Netwo	ork secu	rity an	d the	associ	ated atta	acks	
CO2	To devel	op strateg	ies to prot	ect organi	zation i	nformati	on ass	sets fr	om co	mmon a	ttack	8,
	understar	nd how se	curity poli	cies, stand	dards an	d practi	ces are	e deve	loped			
CO3	To design	n, analyze	and imple	ement diff	erent ne	twork s	ecurity	/ prote	ocols			
CO4	To understand Authentication and Hash function concepts.											
							_					
Mapping	g of Cour	se Outco	mes with	Program	Outcon	nes (PO	s)					
COs/POs	5 PO1	PO2	PO3	PO4	PO5	PO6	PO	7]	PO8	PO9	P	010
CO1	3	3	3	1	1	2	2		2	2		1
CO2	2	2	1	1	2	2	1		3	3		3
CO3	3	3	3	1	1	2	2		2	2		1
CO4	2	2	1	1	2	2	1		3	3		3
COs/PSO	S				PSO1					PSO2		
CO1				2 1								
CO2			2 1									
CO3					1					2		
CO4	I				1	гг				2		
	sec	ses	& ces		ē		ves					
	ienc	enc	ies		COL		scti		 		/ sd	ls
ory	Sci	Sci	unit l Sc		am	am ves	Elé		cal x		shi	skil
teg	sic	23	uma ciaj	cial ogra			en		acti ojeć	•	ern	ft S
Ca	Ba	En	Ht So	H Br Sol Sol Sol Sol Sol					Int	So		



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE02	Network security and cryptography	Ту	3	0	0	3

Unit – I

INTRODUCTION: Introduction to security attacks, services and mechanism, introduction to cryptography. **CONVENTIONAL ENCRYPTION**: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers. **MODERN BLOCK CIPHERS**: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

Unit – II

MATHEMATICAL FOUNDATION: ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffie–Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, ElGamal encryption.

Unit – III

MESSAGE AUTHENTICATION AND HASH FUNCTION: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). DIGITAL SIGNATURES: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm. Unit – IV 9hrs

AUTHENTICATION APPLICATIONS: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

Unit – V

IP SECURITY: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET). System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

REFERENCE BOOKS

- 1. William Stallings, *Cryptography and Network Security: Principals and Practice*", Prentice Hall, New Jersy.
- 2. Johannes A. Buchmann, Introduction to Cryptography, Springer-Verlag.
- 3. Charlie Kaufman, Radia Perlman, Mike Speciner, *Network Security: Private Communication in Public World*, 2nd Edition, Pearson Education.
- 4. AtulKahate, Cryptography and Network Security, TMH, 2018.

Total Hrs:45 hrs

9 hrs

9 hrs

9 hrs

9 hrs



Subject MCS200	Cod CEL	le : 2	Subjec cryptog	t Name graphy la	: No ab	etwork	security	and	T l	y/Lb/ ETL	L	T/SLr	P / R	С
			Prerequ	isite : N	Jetw	orks				Lb	0	0	4	2
L : Lectu	ure 7	[: Tut	orial S.L	r : Supe	rvis	ed Lea	rning P :	Project	R:R	lesearc	h C: 0	Credits		
T/L/ETI	_ : T	heory	/ Lab / Ei	nbedde	d Th	eory a	nd Lab							
OBJEC • Den and	TIV nons Mali	ES : trate v icious s	arious net software e	work sec tc. <i>,</i>	curity	y applic	ations, IP	Sec, Firev	wall, II	DS, Wel	o Secur	ity, Email S	Secu	rity
COURS Students	SE O	OUTC(npletir	OMES ((ng the cou	Cos) : Irse wer	e ab	le to								
CO1	Ide	ntify t	he securit	y issues	s in t	the net	work and	ł resolve	it.					
CO2	An sol	alyse tution.	the vulner	abilities	s in a	any coi	mputing	system a	and he	ence be	able t	o design a	a sec	urity
CO3	Evaluate security mechanisms using rigorous approaches by key ciphers and Hash functions.													
Mappin	g of	Cour	se Outco	mes wit	h P	rogran	n Outco	mes (PC	s)					
COs/PO)s	PO 1	PO2	PO3	PC)4	PO5	PO6	PO)7	PO8	PO9	PC)10
CO1		3	2	2	2		1	3	2		1	3	3	
CO2		2	2	1	1		2	2	1		3	3	3	
CO3		2	2	1	1		2	2	1		3	3	3	
COs/PS	Os						PSO1					PSO2		
CO1							2					1		
CO2							2					1		
CO3	1		2 1											
Category	Basic Sciences		Engg Sciences	Humanities & Social Sciences		Program core		Program Electives	Open Electives	Practical /	Project	Internships / Technical Skills		Soft Skills
										~				



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CEL2	Network security and cryptography lab	Lb	0	0	4	2

- Implement the following Substitution & Transposition Techniques concepts:
 a) Caesar Cipher b) Playfair Cipher c) Hill Cipher d) Vignere Cipher e) Rail fence row & Column Transformation
- 2. Implement the following algorithms a) DES b) RSA Algorithm c) Diffie-Hellmand) MD5 e) SHA-1
- 3. Implement the SIGNATURE SCHEME Digital Signature Standard
- 4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
- 5. Setup a honey pot and monitor the honeypot on network (KF Sensor)
- 6. Installation of rootkits and study about the variety of options
- Perform wireless audit on an access point or a router and decrypt WEP and WPA.
 (Net Stumbler) Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w).



Subject MCS200	Code : CE03	Subjec	t Name	: Adva	inced d	ata science	e	Ty/ Lb/ ETL	L	T/S Lr	P/R	С
		Prerequ	isite : D	ata Mi	ning			Ту	3	0	0	3
L : Lectu	ure T : Tut	orial S.L	r : Supe	rvised	Learni	ng P : Proj	ect R : F	Research	C: C	Credits		
T/L/ETI	L: Theory	/ Lab / Ei	mbedded	d Theor	ry and	Lab						
 OBJEC The from This abil 	TIVES : goal of da data. s requires ity to use t	ata scien an unders hat under	ce is to standing rstandin	constru g of hov g to ide	uct the w value entify b	means for and inform usiness op	r extraction mation flo oportuniti	ng busir ows in a es.	iess-f	ocuseo ness, a	d insigh	nts
COURS	E OUTC	OMES (O	Cos) :									
Students	s completir	ng the cou	irse wer	e able t	0							
CO1	Build pre models	edictive r	nodels	using	neural	networks	s and tin	ne serie	es da	ta fore	castin	g
CO2	Develop decision	an in-de trees ar	epth und nd deep	dersta learni	nding ing	of popula	r method	ds like r	egre	ssion,	cluste	ring,
CO3	ain hands-on experience in machine learning algorithms, the statistical models behind them and the applications of ML											
CO4	D4 Learn optimization formulations											
CO5	Learn to	minimize	errors	and b	uild ac	curate m	odels					
Mappin	g of Cour	se Outco	mes wit	h Prog	ram C	Outcomes	(POs)					
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		PO9	PC	010
CO1	3	2	2	2	1	3	2	1		3		3
CO2	2	2	1	1	2	2	1	3		3		3
CO3	2	2	1	1	2	2	1	3		3		3
CO4	3	2	2	2	1	3	2	1		3		3
CO5	3	2	2	2	1	3	2	1		3		3
COs/PS	Os]	PSO1				PSO2		
CO1						2				1		
CO2						1				2		
CO3						2				1		
CO4	1 2											
CO5						2				1		
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Drocerom corre	1 10gram corc	Program Electives	Open Electives	Practical /	Hoject	Internships / Technical Skills		Soft Skills



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE03	Advanced data science	Ту	3	0	0	3

Unit I:

Introduction : Data science articulated, history and context, Ethical Issues, technology landscape-Parallel databases, parallel query processing, Data engineering, MapReduce, Hadoop, Key-value-stores and NoSQL; tradeoffs of SQL and NoSQL. 9 hrs

Unit II :

Statistical Inference: Populations and samples, Statistical modeling, probability distributions, Fitting a-model, Intro to R-Machine Learning: Supervised Learning: Regression, polynomial regression, local regression, k-nearest neighbors, Unsupervised Learning: Kernel density estimation, k-means, Naive Bayes, Data and Data Scraping, Classification, Ranking, Logistic regression

Unit III :

Introduction to Big Data Analytics :Big Data Platforms, Big Data Storage and Processing, Big Data Analytics Algorithms (Recommendation, Clustering, and Classification), Spark and Data Analytics, Linked Big Data -- I (Graph DB & Graph Analytics, Big Data Applications (TBA))

Unit IV :

Feature Generation and Feature Selection (Extracting Meaning From Data)- Motivating application: user (customer) retention, - Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms (Filters; Wrappers; Decision Trees; Random Forests) Social network analysis, Observational causal modeling, Sampling, data leakage, data incest

Unit V :

Graph Analytics: structure, traversals, analytics, Page Rank, community detection, recursive queries, semantic web Fundamentals of data visualization, Basic principles, ideas and tools for data visualization

REFERENCE BOOKS

1. "Doing Data Science, Straight Talk From The Frontline" : Cathy O'Neil and Rachel

9 hrs

9 hrs

Total Hrs:45Hrs

9 hrs

9 hrs



Subject MCS200	Code : CEL3	Subjec	t Name	e: Advance	ed data sci	ience lat	o i I E	Гу/ Lb/ ZTL	L	T/S Lr	P/R	С
		Prerequ	isite :				-	Lb	0	0	4	2
L : Lectu T/L/ETI	ure T : Tut L : Theory	orial S.L / Lab / Ei	r : Supe mbedde	ervised Lea ed Theory a	arning P : and Lab	Project	R : Res	search	C: (Credits		
OBJEC • Imp • Dev • Emp	TIVES : arting desig eloping des powering st	gn thinking sign skills c udents wi	g capabi of mode th tools	lity to build Is for big da and technic	big-data ta problem ques used i	ns n data so	cience					
COURS	E OUTC	OMES (O	Cos) -									
Students	s completir	ng the cou	irse we	re able to								
CO1	Apply da	ta visuali	sation i	n big-data	analytics							
CO2	Apply da	ta pre-pro	ocessing	g technique	es							
CO3	Apply Ba	asic Mach	ine Lea	arning Algo	orithms							
CO4	CO4 Utilize Matrix decomposition techniques to perform data analysis											
Mappin	g of Cour	se Outco	mes wi	th Program	m Outcon	nes (PO	s)					
COs/POs	s PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		PO9	PC	D10
CO1	3	2	2	2	1	3	2	1		3		3
CO2	2	2	1	1	2	2	1	3		3		3
CO3	2	2	1	1	2	2	1	3		3		3
CO4	3	3	3	2	2	1	3	3		3		2
	COs/PS	SOs			PS	O2					PSO1	
	<u>CO1</u>					1					2	
	C02	$\frac{2}{2}$ 1										
	CO3 CO4	CO4 1 2										
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences		Program core	Program Electives	Open Electives	Practical / Project	,	Internships / Technical Skills	_	Soft Skills
1								 ✓ 				



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CEL3	Advanced Data Science Lab	Lb	0	0	4	2

1 Perform setting up and Installing Hadoop in its two operating modes: Pseudo distributed, -Fully distributed. (ii) Use web based tools to monitor your Hadoop setup

2. Implement the following file management tasks in Hadoop: Adding files and directories Retrieving files Deleting files ii) Benchmark and stress test an Apache Hadoop cluster

3. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm. Find the number of occurrence of each word appearing in the input file(s) Performing a MapReduce Job for word search count (look for specific keywords in a file)

4. Stop word elimination problem: Input: o A large textual file containing one sentence per line o A small file containing a set of stop words (One stop word per line) Output: A textual file containing the same sentences of the large input file without the words appearing in the small file.

5. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented. Data available at: https://github.com/tomwhite/hadoopbook/tree/master/input/ncdc/all. - Find average, max and min temperature for each year in NCDC data set - Filter the readings of a set based on value of the measurement, Output the line of input files associated with a temperature value greater than 30.0 and store it in a separate file.

6. Purchases.txt Dataset - Instead of breaking the sales down by store, give us a sales breakdown by product category across all of our stores o What is the value of total sales for the following categories - Toys - Consumer Electronics - Find the monetary value for the highest individual sale for each separate store 8 What are the values for the following stores? - Reno - Toledo - Chandler Find the total sales value across all the stores, and the total number of sales.

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

8. Write a Pig Latin scripts for finding TF-IDF value for book dataset (A corpus of eBooks available at: Project Gutenberg)

9. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

10. Install, Deploy & configure Apache Spark Cluster. Run apache spark applications using Scala.



Subject	Code :	Subjec	t Name	• Introdu	ction to	intellio	ent					
MCS20		system	t manne	• muouu		memg	ciit	Ty/	-	T/S	P /	G
WIC520	CL04	system						Lb/	L	Lr	R	С
								ETL				
		Prerequ	uisite : A	Artificial I	ntellige	ncce		Ту	3	0	0	3
L : Lect	ure T : Tut	orial S.L	r : Supe	ervised Le	arning I	P : Proje	ect R:F	Researc	h C: (Credits		
T/L/ETI	: Theory	/ Lab / E	mbedde	d Theory	and Lab)						
OBJEC	TIVES :											
• To c	conceptualiz	e the bas	ic ideas a	and techni	ques uno	derlying	the desig	n of int	elliger	it systen	ns.	
• To	make stude	nts under	stand an	d Explore	the mecl	hanism o	of mind t	hat enal	ble int	elligent	thoug	ht and
acti	on.											
• . To	make stude	ents unde	rstand a	dvanced re	epresenta	ation for	rmalism a	and sear	ch tec	hniques		
• To	make stude	nts under	stand ho	ow to deal	with unc	ertain a	nd incom	iplete in	forma	ition.		
COURS	SE OUTCO	OMES (Cos) -									
Students	s completin	ig the cou	irse wei	e able to								
CO1	Ability to	develop	a basic	understar	nding of	AI buil	ding blo	cks pre	sente	d in inte	elliger	ıt
	agents.											
CO2	Ability to	analyze	the stre	ngth and	weaknes	sses of A	AI appro	aches to	o kno	wledge-	- inte	nsive
	problem s	solving.										
CO3	Ability to	apprecia	ite the in	mportance	e of opti	mizatio	ns and it	s use ir	n com	puter er	nginee	ring
	fields and	l other do	omains.									
CO4	Ability to	understa	and the o	difference	betwee	n learni	ng and p	orogran	nming	and ex	plore	
	practical applications of Neural Networks (NN).											
CO5	understa	nd the eff	ficiency	of a hybr	id system	m and h	low Neu	ral Net	work	and fuz	zy log	ic can
	be hybrid	ized to fo	orm a N	euro-fuzz	y netwo	rk and i	its vario	ıs appli	cation	ns		
Mappin	ig of Cours	se Outco	mes wit	th Progra	m Outo	comes (POs)					
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	PO	7 P	08	PO9	I	'O10
CO1	3	2	2	2	1	3	2		1	3		3
CO2	2	2	1	1	2	2	1		3	3		3
CO3	2	2	1	1	2	2	1		3	3		3
CO4	3	3	3	2	2	1	3		3	3		2
CO5	3	3	3	2	2	1	3		3	3		2
COs/PS	Os		·	1	PSC	01	I		I	PSO2		
CO1					2					1		
CO2					1					2		
CO3					2					1		
CO4					1					2		
CO5					2					1		
			S							s L		
L.	S	S	itie al	S	я	es n	es	al /		hip iica		ills
6g0	ic	g	nan oci	succ	gra	grai	in Xiiv	xtic	lect	rns chr	ls	SI
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	що	Ц	T S		с <u>г</u>	нш	ОЦ	ш		I \		



Elective 2

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE04	Introduction to intelligent system	Ту	3	0	0	3

Unit-1

Concept of Artificial Intelligence. Areas of Artificial Intelligence, Foundations of Fuzzy Logic, Foundations of Fuzzy Control.

Unit-2

Types of Fuzzy Controllers, Fuzzy Logic Toolbox, Creation of Fuzzy Inference System with Fuzzy Logic Toolbox.

unit-3

Creation of Fuzzy Controllers, Weather-compensated Temperature Control of a Heat, Exchanger using Fuzzy Controllers.

unit-4

Neural Networks. Neuron Model, Perceptron Model, Modeling of Basic Logic Functions using the Perceptrons.

unit-5

Feedforward Neural Network with Backpropagation Error, Approximation of Functions by a Two-layer Feedforward Neural Network, Character Recognition using Two-layer Feedforward Neural Network, Creation of a Neural Networks with Neural Network Toolbox.

Total Hrs:45 hrs

REFERENCE BOOKS

- 1. KELEMEN, J. Základyumelejinteligencie. Bratislava: Alfa, 2018.
- 2. ŠIMČÁK, P. -- ANDREJKOVÁ, G. Neurónovésiete. Košice: TU, 2016.
- 3. NÁVRAT, P. Umeláinteligencia. Bratislava: STU, 2018.
- 4. VAŠČÁK, J. Fuzzy logika v regulácii. Košice: TU, 2016.
- 5. KVASNIČKA, V. Umeláinteligencia a kognitívnaveda. Bratislava: STU, 2017.
- 6. THEMATHWORKS, M. Fuzzy Logic Toolbox, Neural Network Toolbox-Users Guide. [online]. 2017. URL: <u>http://mathworks.com</u>.

9 hrs

9 hrs

9 hrs

9 hrs

9 hrs



Subject MCS200	Code : CE05	Subjec Archite	t Name cture	: Adv	anced C	Computer	•	Ty/Lb TL	/E	L	T/S Lr	P/R	С
		Prerequ	isite : C	Compu	ter Arcl	nitecture		Ty		3	0	0	3
L : Lectu	re T : Tut	orial S.L	r : Supe	ervised	l Learni	ng P : Pr	oject	R : Res	earch	C: (Credits		
T/L/ETI	L: Theory	/ Lab / Ei	mbedde	d The	ory and	Lab	-						
OBJEC	TIVES :												
• To n	nake stude	nts know a	about the	e Para	llelism co	oncepts in	Prog	ramming					
• To s	study the h	ierarchical	memor	y syste	em incluc	, ding cache	e mem	iories an	d virtu	al m	emory.		
• To r	nake the st	udents kn	ow abou	ut the	importar	nce of mu	ltiprod	cessor an	d mul	ticon	nputers		
COURS	E OUTC	OMES (O	Cos) :										
Students	completin	ng the cou	irse wer	e able	to								
CO1	Demonst	rate conce	epts of p	paralle	elism in	hardware	e/softv	ware.					
CO2	Describe	architect	ural feat	tures of	of advan	ced proc	essors	5.					
CO3	Interpret	nerforma	nce of d	liffere	nt nineli	ined proc	essor	s					
000	interpret	periorina			in pipel	inca proc	05501	5					
CO4	Explain c	lata flow	in arithı	metic	algorith	ms							
CO5	Development of software to solve computationally intensive problems.												
Mappin	g of Cour	se Outco	mes wit	th Pro	ogram (Outcome	s (PO	s)					
COs/POs	5 PO1	PO2	PO3	PO4	PO5	PO6	PO	7 P	08	P	09	PO	10
CO1	3	2	2	2	1	3	2		1		3	3	5
CO2	2	2	1	1	2	2	1		3		3	3	6
CO3	2	2	1	1	2	2	1		3		3	3	6
CO4	3	3	3	2	2	1	3		3		3	2	
CO5	3	3	3	2	2	1	3		3		3	2	2
COs/PSO	Os]	PSO1					PSO2		
CO1						1					1		
CO2						$\frac{1}{2}$					2		
C03						<u></u> 1					1		
C04						1 1					$\frac{2}{2}$		
005						1					2		
	es	SS	k ces		1)		es				ills		
	enc	enco	es d iend		core		ctiv				os / I Sk		s
ory	Sci	Scie	niti Sc		E E	um /es	Ele		cal,	•	shif ical		kill
teg(sic	20	ma vial		gr:	gre ctiv	en		ictic) ()	ern: thn		ft S
Cai	Ba	En	Hu Soc		Prc	Prc Ele	OD	2	Pro		Inte		Sol
					~								
			l		-	1							



- 5. High-performance Computer Architecture, by Harold Stone Addison Wesley (2016) 3rded.
- Approach, Third Edition, Morgan Kaufmann, May 2018.
- Publishing, 2017

- non-linear pipeline pipeline processors, superscalar and superpipeline design. Unit 4 9 hrs

SIMD array architecture: SIMD array processors, SIMD interconnection network,

Associative array processors.

Unit 5

MIMD multiprocessor and multicomputers:

Subject Name

Advanced Computer

Architecture

Multiprocessor architecture (loosely coupled, tightly coupled), interconnection networks, cache coherence and synchronization mechanism multiprocessor operating systems, exploiting concurrency. Review of modern processors-Pentium Processor: IA 32 and P6 micro architectures, ARM Processor.

REFERENCES:

- 1. Advanced Computer Architectures A Design space approach, DezsoSima, Terence Fountain, Peter Kacsuk, Pearson Education 2017.
- 2. K Hwang, Advanced Computer Architecture, Tata McGraw-Hill Education, 2016
- 3. David E. Culler, Jaswider Pal, Parallel computer Architecture, Gulf Professional
- 4. John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative
- 6. Parallel Computer Architecture: A Hardware/Software Approach David Culler and J.P. Singh with Anoop Gupta, Morgan Kaufmann (August 2016).

Introduction to Parallel Processing: Parallelism in uniprocessor system; parallel computer structure, architectural classification schemes.

Memory management and organization: Memory hierarchy, Virtual memory system, memory allocation and management, cache memory management. Mapping and management techniques, memory replacement policies.

Unit 3

Pipelining and Vector Architecture: Instruction and arithmetic pipelines design, linear and

Unit 1

Subject

Code

MCS20CE05

Unit 2



3

T/SLr

0

L

0

9 hrs

9 hrs

9 hrs

Total Hrs:45 hrs





Ty/Lb/ETL

3

M.TECH – COMPUTER SCIENCE AND ENGINEERING

Ty/Lb/

ETL

Тy

9 hrs

P/R



Subject MCS200	Code : CE06	Subje Comp	ct Nam uting	e : Grid	and clou	ıd		Ty/Lb/ ETL	L	T/S Lr	P/R	С
1100200	200	Prerec	uisite :					Tv	3	0	0	3
L : Lectu	are T : Tut	orial S.	Lr : Sup	ervised	Learning	g P : Proje	ect R	: Researc	h C:	Credits	1	
T/L/ETI	L: Theory	/ Lab / I	Embedd	ed Theo	ry and L	ab						
OBJEC	TIVES :											
• Und	erstand ho	w Grid co	omputin	g helps ir	n solving	large scale	scient	tific probl	ems.			
• Gai	n knowledg	ge on the	concept	t of virtua	alization	that is fund	damen	ital to clo	id com	puting.		
• Lea	rn how to p	orogram	the grid	and the d	cloud.		•					
• Und	ierstand th	e securit	y issues	in the gri	a and the	e cioud en	vironm	ient				
COUPS		OMES										
Students	completin	ng the co	ourse we	ere able	to							
CO1	Apply gr	id comp	uting te	chniques	s to solve	e large sca	ale sci	entific p	oblen	ns		
CO2	Apply the	e concep	ot of virt	ualizatio	on.							
CO3	Use the g	rid and	cloud to	ol kits								
	C.											
CO4	Apply the	e securit	y mode	ls in the	grid and	the cloud	l envi	ronment.				
CO5	comprehend the Programming models in the grid and the cloud environment.											
Mappin	g of Cour	se Outc	omes w	ith Prog	gram Ou	utcomes ((POs)					
COs/POs	5 PO1	PO2	PO3	PO4	PO5	PO6	PO7	7 PO	8 :	PO9	PO10	
CO1	3	1	2	3	3	2	2	2		1	2	
CO2	1	2	2	3	1	2	2	2		1	2	
CO3	2	2	1	1	2	2	1	3		3	3	
CO4	3	3	3	1	1	2	2	2		2	1	
CO5	1	2	3	1	2	3	1	2		3	2	
COs/PS	Os			PSO1				PSO	2			
CO1						1				2		
CO2						$\frac{1}{2}$				2		
C03						2				1 2		
C04						1				$\frac{2}{2}$		
0.05						1				4		
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Duccenter		Program Electives	Open Electives	Practical /	Project	Internships / Technical Skills		Soft Skills
					 							



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE06	Grid and cloud	Ту	3	0	0	
MCS20CE00	Computing					3
UNIT I INTR	ODUCTION					9 hrs

UNIT I INTRODUCTION

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers – Grid computing Infrastructures - cloud computing - service oriented architecture - Introduction to Grid Architecture and standards - Elements of Grid - Overview of Grid Architecture.

UNIT II GRID SERVICES

Introduction to Open Grid Services Architecture (OGSA) - Motivation - Functionality Requirements - Practical & Detailed view of OGSA/OGSI - Data intensive grid service models - OGSA services.

UNIT III VIRTUALIZATION

Cloud deployment models: public, private, hybrid, community - Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing - Implementation levels of virtualization - virtualization structure virtualization of CPU, Memory and I/O devices - virtual clusters and Resource Management - Virtualization for data center automation.

UNIT IV PROGRAMMING MODEL

Open source grid middleware packages - Globus Toolkit (GT4) Architecture, Configuration - Usage of Globus - Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT V SECURITY

Trust models for Grid security environment - Authentication and Authorization methods -Grid security infrastructure - Cloud Infrastructure security: network, host and application level - aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud. **Total Hrs:45 Hrs**

REFERENCE BOOKS

- 1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2016.
- 2. Jason Venner, "Pro Hadoop- Build Scalable, Distributed Applications in the Cloud", A Press, 2018
- 3. Tom White, "Hadoop The Definitive Guide", First Edition. O"Reilly, 2016.
- 4. Bart Jacob (Editor), "Introduction to Grid Computing", IBM Red Books, Vervante, 2017
- 5. Ian Foster, Carl Kesselman, "The Grid: Blueprint for a New Computing Infrastructure", 2nd Edition, Morgan Kaufmann.
- 6. Frederic Magoules and Jie Pan, "Introduction to Grid Computing" CRC Press, 2018.
- 7. Daniel Minoli, "A Networking Approach to Grid Computing", John Wiley Publication, 2016.
- 8. Barry Wilkinson, "Grid Computing: Techniques and Applications", Chapman and Hall, CRC, Taylor and Francis Group, 2018.

9 hrs

9 hrs

9 hrs

9 hrs



Subject MCS200	Code : CE07	Subjec	t Name	e:Comp	uter vision		Ty/L	b/ET	LL	T/S Lr	P/R	С
		Prerequ	isite :				,	Ту	3	0	0	3
L : Lectu	are T : Tut	orial S.L	r : Supe	ervised L	earning P	: Proje	ct R :	Rese	arch C:	Credits	•	
T/L/ETI	L: Theory	/ Lab / E	mbedde	d Theory	y and Lab							
OBJEC	TIVES :											
• Cover	the basic	theory an	d algor	ithms tha	t are wide	ly used	in dig	gital iı	mage pr	ocessing	g.	
• Expos	e students	to curren	t techn	ologies a	nd issues t	hat are	speci	fic to	image p	rocessi	ng syste	ems.
Develo	p hands-or	n experien	ce in usi	ng compi	iters to pro	cess im	ages.					
COURS	E OUTC	OMES (Cos) :									
Students	completin	ng the cou	irse wei	re able to)							
	1	<u> </u>										
CO1	identify b	basic conc	cepts, te	erminolog	gy, theorie	s, mode	els an	d met	hods in t	the field	of	
CON	computer	r vision	opio th		lalaarithaa	a that	<u> </u>	<u>idah (</u>	upped in	diaital	imaga	
CO2	Drocessi	and the b	asic th	eory and	algorithm	is that	are w	laely	usea in	aigitai	image	
	processi	ng.										
CO3	Understa	and imag	e analy	vsis algo	rithms.							
CO4	Understa	and curre	nt appl	ications	in the field	d of Im	age F	Proces	ssing.			
CO5	Develop hands-on experience in using computers to process images.											
Mappin	g of Cour	se Outco	mes wi	th Prog	am Outco	mes (I	$\frac{1}{2Os}$					
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO	6	PO7	PO8	PO9	PO	10
CO1	3	1	2	3	3	2		2	2	1	2	}
CO2	1	2	2	3	1	2		2	2	1	2)
CO3	2	2	1	1	2	2		1	3	3	3	6
CO4	3	3	3	1	1	2		2	2	2	1	
CO5	1	2	3	1	2	3		1	2	3	2	
	COs/P	SOs	1	_1	PSO	[PSO2		
	CO	1			1					2		
	CO	2			1					2		
	CO	3			2					1		
		4 ī			2					1		
	CO	5			1					2		
			s &	ore								
Ż	S	S	itie	n ce		n se		Se	la /	lips -	cal	ills
10g 01	ic	g ince	al al	ince jrar		grar	и.	NHX	stic; ect	tmsł	ls	Sk
Cate	3asi Sasi	Ing	Hun	scie rog		Prof 3lec	Dpe	tlec	roj.	ntei	skil	oft
\vdash		щω	ТХ						щЦ			0 1
				×								



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE07	Computer vision	Ту	3	0	0	3

Unit – I

INTRODUCTION: Machine vision systems, optics and lenses, image sensors, human vision and Neuro-visual model; Marr's paradigm; Imaging geometry - world co-ordinate system and camera co-ordinate system, co-ordinate transformations, projection geometry, camera calibration, radiometry.

Unit – II

9 hrs

9 hrs

EARLY PROCESSING AND IMAGE FILTERING: Noise removal, region segmentation, concept of primal sketch, scale space, edge detection and localization, edge linking, Hough transform, corner and junction detection. Reflectance map and photometric stereo: Image brightness and radiometry, image formation and surface reflectance under different conditions, reflectance map and bidirectional reflectance distribution function, photometric stereo recovering albedo and surface orientation, shape from shading. 9 hrs

Unit – III

RANGE MEASUREMENT AND RECOVERING SCENE GEOMETRY: Binocular technique stereo pair, epipolar line and plane, Stereo matching, photogrammetry, monocular technique - texture processing and shape from texture, depth from focusing and symmetry, different range finder (active) - laser range finder, light-stripe method. 9 hrs

Unit – IV

MOTION ESTIMATION: Motion field, optical flow - smoothness, boundary conditions, discontinuities of optical flow, block based method, pre-recursive method, Bayesian method, Motion segmentation method, motion from points and lines, token tracking, stereo and motion tracking, use of Kalman filter, focus of expansion, structure from motion, motion compensated filtering and restoration, video compression, active and passive surveillance. Unit – V 9 hrs

REPRESENTATION AND ANALYSIS OF POLYHEDRAL SCENE: understanding line drawings, gradient and dual space, generalized cylinder, volumetric representation, edge and junction labelling; Labelling and recognition of scene objects; Construction of model-base and visual learning, model based recognition system - Acronym, model based recognition from sparse range data, 3D model based vision system, scene understanding.

REFERENCE BOOKS

- 1. D. H. Ballard and C. M. Brown, *Computer Vision*, Prentice Hall, New York, 2016.
- 2. R. M. Haralick, L. G. Shapiro, Computer and Robot Vision, Addison-Wesley, 2018.
- 3. Y. Shirai, Three-Dimensional Computer Vision, Springer-Verlag Berlin, 2017.
- 4. B. K. P. Horn, Robot Vision, MIT Press, Cambridge, 2016.

M.TECH – COMPUTER SCIENCE AND ENGINEERING **REGULATION – 2020**

Total Hrs:45 Hrs



M.TECH – COMPUTER SCIENCE AND ENGINEERING Subject Code : Subject Name : Human computer interaction Ty/ T/S **P**/ MCS20CE08 Lb/ L С Lr R ETL Prerequisite : Τv 3 0 3 0 L: Lecture T: Tutorial S.Lr: Supervised Learning P: Project R: Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab **OBJECTIVES :**

- To stress the importance of a good interface design.
- To understand the importance of human psychology in designing good interfaces.
- To motivate students to apply HMI in their day to day activities.
- To bring out the creativity in each student build innovative applications that are user friendly

COURSE OUTCOMES (Cos) :

Students completing the course were able to

001	T 1 '			6							
COI	To desig	n user cen	itric inte	erfaces							
CO2	To desig	n innovati	ive and	user frie	ndly inte	rfaces.					
CO3	To apply	HMI in t	heir day	/-today a	ctivities.						
CO4	To critic	ise existin	g interf	ace desig	gns, and i	improve	them.				
CO5	To Desig	gn applica	tion for	social a	nd techni	cal task	•				
Mappin	g of Cour	se Outco	mes wi	th Prog	am Out	comes (POs)				
COs/POs	5 PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	0
CO1	3	1	2	3	3	2	2	2	1	2	
CO2	1	2	2	3	1	2	2	2	1	2	
CO3	2	2	1	1	1 2 2 1 3 3 3						
CO4	3	3	3	1	1	2	2	2	2	1	
CO5	1	2	3	1	2	3	1	2	3	2	
	COs/P	SOs			PSC	D1			PSO2	2	
	CO	1			2				1		
	CO	2			1				2		
	CO	3			1				2		
	<u> </u>	4			2				1		
	CO	5			2	<u> </u>			<u> </u>		
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core		Practical / Project	Internships / Technical Skills		Soft Skills		
						\checkmark					



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE08	Human computer interaction	Ту	3	0	0	3

UNIT-I

Introduction: Course objective and overview. Historical evolution of the field, The Human, The Computer, The Interaction.-Design processes: Interaction Design basics, Concept of usability – definition and elaboration, HCI in the Software Process, Design Rules.

UNIT-II

Implementation and Evaluation: Implementation Support, Evaluation Techniques, Universal Design, Use Support.

UNIT-III

Models: Cognitive Models, Socio - Organizational Issues and Stakeholders Requirements, Communication and Collaboration models.

UNIT-IV

Theories: Task Analysis Dialog notations and Design Models of the system Modeling Rich Interactions.

UNIT-V

Modern Systems: Group ware, Ubiquitous Computing computing and Augmented Realities **Total Hrs:45 Hrs** Hypertext Multimedia and World Wide web.

REFERENCE BOOKS

- 1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, Human Computer Interaction, 3rd Edition Pearson Education.
- 2. Preece J., Rogers Y., Sharp H., Baniyon D., Holland S. and Carey T., Human Computer Interaction, Addison-Wesley, 2016.
- 3. B. Shneiderman, Designing the User Interface, Addison Wesley 2017 (Indian Reprint).

4 Jenny Preece, Helen Sharp, Yvonne Rogers, Interaction Design: Beyond Human-Computer Interaction, 4th Edition, Wiley Publication.

- 5 Gerard Jounghyun Kim, Human-Computer Interaction: Fundamentals and Practice, CRC Press.
- 5 Jenifer Tidwell, Designing Interfaces 2nd Edition, Patterns for Effective Interaction Design, O'Reilly Media

9 HRS

9 HRS

9 HRS

9 HRS

9 HRS







Subject MCS200	Code : CE09	Subje	ect Name	e : Natu	ral lang	guage proc	essing	Ty/ Lb/ ETL	L	T/S Lr	P/R	С
		Preree	quisite : I	ML.AI				Ту	3	0	0	3
L : Lectu	re T : Tut	orial S	Lr : Sup	ervised	Learni	ng P : Proje	ect R : I	Research	C: (Credits		
T/L/ETL	: Theory	/ Lab / 1	Embedde	ed Theo	ry and	Lab						
OBJEC'	TIVES :	onto the	looding	tranda		votomo in	notural		0.010		a	
• N • N	lake then f the lang	n under luage a	stand the nd that the	e conce hey are	epts of able to	morpholog o give the	gy, synta appropi	ax, sema riate exa	antic ample	s and j es that	oragma will	atics
• T u	each thei nderstan	m to rea ding.	cognize t	the sigr	nificanc	s. e of pragr	natics fo	or natura	al lan	guage		
COURS Students	E OUTC completin	OMES	(Cos) : ourse we	re able	to							
CO1	NLP atte	empts t	o intera	ct with	huma	ns and hu	man te	xts via la	angu	age.		
CO2	Problem	is in the	e domai	n inclu	de ana	lyzing tex	ts to dis	scover st	truct	ures a	nd to r	nake
	decision	S										
CO3	Issues for languages with relatively poor tagged resources are how to boost											
	unsuper	vised a	nd semi	-super	vised n	nethods fo	or the p	urposes	of a	nalysis	5.	
CO4	Translat	ing fro	m one la	inguag	e to an	other. Int	eracting	g with h	uma	ns in c	lialogu	le
	systems	or coo	perative	tasks								
Mappin	g of Cour	se Outo	comes wi	th Prog	gram C	Dutcomes (POS)	DOG		DOG	D(210
COS/PO	s POI	PO2	PO3	<u>PO4</u>	P05	PO6	PO7	P08	_	209	P	210
	2	2	1	1	<u> </u>	2	1	3		3		3 1
C02	3	3	3	1		2	2	2		2		1
$\frac{003}{004}$		<u> </u>	3	1	2	3	1			<u> </u>		2
004	3	1	2	3			4					4
		<u>50s</u>			1	1				PS02		
		ו ז				1				$\frac{2}{2}$		
		2				1				$\frac{2}{2}$		
		<u> </u>				1				$\frac{2}{2}$		
		+		<u> </u>		1				2		
Category	Basic Sciences	Engg Sciences	Humanitie s & Social	Sciences	core	Program Electives	Open Electives	Practical /	mini	Internship s /	Technical Skills	Soft Skills
						 						



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE09	Natural language processing	Ту	3	0	0	3

Unit I

Introduction, Machine Learning and NLP, ArgMax Computation WSD: WordNet, Wordnet; Application in Ouery Expansion, Wiktionary; semantic relatedness, Measures of WordNet Similarity

Unit II

Similarity Measures, Resnick's work on WordNet Similarity, Parsing Algorithms, Evidence for Deeper Structure; Top Down Parsing Algorithms, Noun Structure; Top Down Parsing Algorithms, Non-noun Structure and Parsing Algorithms

Unit III

Probabilistic parsing; sequence labeling, PCFG, Training issues; Arguments and Adjuncts, Probabilistic parsing; inside-outside probabilities, Speech : Phonetics, HMM, Morphology

Unit IV

Graphical Models for Sequence Labelling in NLP, Phonetics, Consonants (place and manner of articulation) and Vowels, Forward Backward probability; Viterbi Algorithm, Phonology, Sentiment Analysis and Opinions on the Web, Machine Translation and MT Tools - GIZA++ and Moses, Text Entailment, POS Tagging, Phonology; Unit V

ASR, Speech Synthesis, HMM and Viterbi, Precision, Recall, F-score, Map, Semantic Relations; UNL; Towards Dependency Parsing, Universal Networking Language, Semantic Role Extraction, Baum Welch Algorithm; HMM training.

Total Hrs:45 hrs

REFERENCE BOOKS

- 1. Allen, James, Natural Language Understanding, 2 nd Edition, Benjamin/Cumming, 2016.
- 2. Charniack, Eugene, Statistical Language Learning, MIT Press, 2018.
- 3. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2 nd Edition, Prentice Hall, 2018.
- 4. Manning, Christopher and Heinrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 2017.

9 HRS

9 HRS

9 HRS

9 HRS

9 HRS



Subject MCS200	Code : CE10	Subjec Analysi	t Name is	: Data P	reparatic	on and] I E	Гу/ Lb/ TL	L	T/S Lr	P/R	С
		Prerequ	isite : D	Data Min	ing			,	Ту	3	0	0	3
L : Lectu	ure T : Tut	orial S.L	r : Supe	rvised L	earning I	P : Proje	ect R	: Res	search	n C: C	Credits		
T/L/ETI	: Theory	/ Lab / Ei	mbeddeo	d Theory	and Lat)							
OBJEC	TIVES :												
Prov	vide insight	into meth	ods and	tools for	analysis a	and proc	essing	of th	e dat	a gene	erated b	y mode	ern
info	rmation sys	stems											
COURS	SE OUTCO	OMES (O	Cos) :										
Students	s completir	ng the cou	irse wer	e able to									
<u>CO1</u>	ovnloin b	ocio torm	a in tha	oron of I	nformati	on Suct	ome de	avalo	nmo	nt and	manac	romont	-
COI	group dat	asic term	s III tile	alea ol 1	ms accord	ding to	their n	urpo	opinei se ai	nd giv	manag Me an in	sight i	., nto
	the statist	ical meth	ods of c	lata anal	vsis and	nredicti	on.	Juipo	, sc, a		c an m	Signi I	nto
CO2	Explain r	nethods o	of data a	nalysis i	n a comp	any, de	fine b	usine	ess sit	uatio	ns in w	hich da	ata
	processin	g method	ls are ap	plicable	. 1	<u> </u>							
CO3	Demonst	rate use o	f SQL f	or extrac	ting and	prepari	ng dat	ta					
CO4	Create SO	QL querie	es for ex	tracting	and grou	ping da	ta fror	n dif	feren	t type	s of da	tabase	
	managem	ent syste	ms	U	U					•1			
CO5	define scope of use of different types of data base management systems.												
Mappin	g of Cour	se Outco	mes wit	h Progr	am Out	comes (POs)						
COs/POs	s PO1	PO2	PO3	PO4	PO5	PO6		PO7	' F	PO8	PO) PC	D10
CO1	2	2	1	1	2	2		1	3		3	3	
CO2	3	3	3	1	1	2		2	2		2	1	
CO3	1	2	3	1	2	3		1	2		3	2	
CO4	3	1	2	3	2	2		2	2		2	2	
CO5	3	3	3	1	1	2		2	2		2	1	
COs/PS	$\frac{1}{0s}$	•		-	PS($\frac{1}{1}$					PSO2	-	
CO1	05				2	<i>,</i>					1502		
CO2					2						1		
CO3					1						2		
CO4					1						2		
~ ~ -										2			
CO5					1								
CO5			s		1						S		
CO5	Ices	ces	& nces		i e		ives				/ kills		
CO5	siences	iences	ties & ciences		1 core	_ ~	ectives		/ 1		ips / al Skills		lls
CO5	: Sciences	Sciences	anities & Il Sciences		ram core	ram ives	(Electives		ical /	sct	nships / nical Skills		Skills
ategory	asic Sciences	ngg Sciences	umanities & ocial Sciences		ogram core	ogram ectives	pen Electives		actical /	oject	ternships / schnical Skills		oft Skills
Category 502	Basic Sciences	Engg Sciences	Humanities & Social Sciences		Program core	Program Electives	Open Electives		Practical /	Project	Internships / Technical Skills		Soft Skills
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences		Program core	Program Electives	Open Electives		Practical /	Project	Internships / Technical Skills		Soft Skills



Elective 4

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE10	Data preparation and analysis	Ту	3	0	0	3
II						A LIDC

Unit – I

INTRODUCTION: Introduction to BigData Platform, Challenges of Conventional Systems, Intelligent data analysis, Nature of Data, Analytic Processes and Tools, Analysis vs Reporting, Modern Data Analytic Tools.

STATISTICAL CONCEPTS: Sampling Distributions, Re-Sampling, Statistical Inference, Prediction Error.

Unit – II

MINING DATA STREAMS: Introduction To Streams Concepts, Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Oneness in a Window, Decaying Window, Real time Analytics Platform(RTAP) Applications , Stock Market Predictions. **9 HRS**

Unit – III

HADOOP: History of Hadoop, The Hadoop Distributed File System, Components of Hadoop, Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFSBasics, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features.

Unit – IV

HADOOP ENVIRONMENT: Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration-Security in Hadoop, Administering Hadoop, HDFS - Monitoring Maintenance-Hadoop benchmarks, Hadoop in the cloud

Unit – V

FRAMEWORKS: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper, IBM InfoSphereBigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications.

Total Hrs:45 Hrs

REFERENCE BOOKS

- 1. Michael Minelli, Michele Chambers, AmbigaDhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, 2016.
- 2. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, TMH, 2018.
- 3. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2017.
- 4. Tom White, *Hadoop: The Definitive Guide*, 3rd Edition, O'reilly Media, 2016.

9 HRS

9 HRS

9 HRS

9 HRS



Subject MCS200	Code : CEL10	Subject Name : Data Preparation and Analysis Lab							Ty/ Lb/ ETL	L	T/S Lr	P/R	С		
	Prerequisite :								Lb	0	0	4	2		
L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits															
T/L/ETL : Theory / Lab / Embedded Theory and Lab															
OBJECTIVES :															
Learn pre-processing method for multi-dimensional data . data cleaning mechanisms and data															
expl	oratory an	alysis					,		0						
	,	•													
COURS	E OUTC	OMES (Cos):												
Students completing the course were able to															
CO1	Learn pre-processing method for multi-dimensionaldata														
CO2	Prostige on data algoningmechanisms														
02															
CO3	Learn various data exploratory analysis														
Mapping of Course Outcomes with Program Outcomes (POs)															
COs/POs	PO1	PO2	PO3	PC)4	PO5	PO6	PO7	PO	8 I	PO9	PO10)		
C01	3	1	2	3		2	2	2	2	2		2			
CO2	3	1	2	3		2	2	2	2	2	2	2			
CO3	3	2	2	3		2	2	2	2	2	2	2			
COs/PSOs				PSO1				PSO2							
CO1				2				1							
CO2	1				2										
CO3	2								1						
	ses	es	& ces		o			/es			cills				
	enc	gg Scienc manities d	gram core		10,		ctiv			SI / SI		s			
ory	Sci					m /es	en Ele	al,	L	shif [ca]		kill			
egc	ic				άI α	gra ctiv		ctic	jec	hn		t S]			
Cat	Bas	Eng	Hur Soc		Pro		Pro Ele	эdС	Pra	Pra Prc Inte		Sof			
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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CEL10	Data preparation and analysis lab	Lb	0	0	4	2

- 1. Install, configure and run Hadoop and HDFS
- 2. Implement word count / frequency programs using MapReduce
- 3. Implement an MR program that processes a weather dataset R
- 4. Implement Linear and logistic Regression
- 5. Implement SVM / Decision tree classification techniques
- 6. Implement clustering techniques
- 7. Visualize data using any plotting framework
- 8. Implement an application that stores big data in Hbase / MongoDB / Pig using Hadoop / R.



Subject MCS200	Code : CE11	Subje Forr	ct Nam nal lang	e : uage an	d automat	a theory		Ty/I /ET	Lb L	T/S Lr	P/R	С
		Prerec	uisite :	Princip	les of Cor	npiler		Ту	3	0	0	3
L : Lectu	ire T : Tut	orial S.	Lr : Sup	ervised	Learning	P : Projec	tR:	Rese	arch C:	Credits		
T/L/ETL	L: Theory	/ Lab / H	Embedde	ed Theo	ry and La	b						
OBJEC	TIVES :											
• Intro	oduce the	student	to the co	oncepts	of theory	of comput	tation	in co	mputer s	science.		
 acqu 	uire insigh	ts into tl	he relation	onship a	among for	mal langu	iages,	form	al gramr	nars, and	d auto	mata.
• lear	n to desigr	automa	ats and T	Furing n	nachine							
COURS	E OUTCO	OMES (S (Cos) :									
Students	completin	ig the co	the course were able to									
CO1	demonstr (DFA), n	ate an u on-deter	te an understanding of abstract models of computing, including deterministic n-deterministic (NFA), and Turing (TM) machine models									ic
CO2	Able to e	ble to employ finite state machines for modeling and solving computing problems.										
CO3	Able to d	esign co	ntext fro	ee gram	mars for f	ormal lan	iguage	s.				
CO4	demonstr	ate an u	nderstar	ding of	regular ex	xpressions	s and g	gram	mars, inc	cluding o	contex	t-free
	and conte	xt-sensi	tive gra	m-mars.								
CO5	able to de	esign Tu	ring Ma	chine								
		U	U									
Mappin	g of Cour	se Outc	omes wi	ith Prog	gram Out	tcomes (P	POs)					
COs/POs	5 PO1	PO2	PO3	PO4	PO5	PO6	P	07	PO8	PO9	P	010
CO1	3	1	2	3	2	2		2	2	2		2
CO2	2	2	2	1	1	2		2	3	3		3
CO3	3	1	2	3	2	2		2	2	2		2
CO4	2	2	2	1	1	2		2	3	3		3
CO5	3	1	2	3	2	2		2	2	2		2
COs/PSC)s				PS	01				PSO2		
CO1					2					1		
CO2					1	-				2		
CO3		1 2										
CO4					1					$\frac{2}{2}$		
CO4					1 1 1					$\frac{2}{2}$		
CO4 CO5					1 1 1					$\begin{array}{c} 2 \\ \hline 2 \\ \hline 2 \\ \hline \end{array}$		
CO4 CO5	ses	es	& ces		1 1 1		ves			2 2 2 stills		
CO4 CO5	ences	ences	ies & iences		1 1 1 core		ctives			ps / 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		S
CO4 CO5 Kao	Sciences	Sciences	unities & l Sciences		1 1 1	am ves	Electives		cal / t	ships / 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		skills
CO4 CO5 Koros	isic Sciences	igg Sciences	imanities & cial Sciences		1 1 1	ogram ectives	oen Electives		actical /	cernships / 2 2 2 Cernships / 2 2 2 Cernstal Skills 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		ft Skills
Category Cot	Basic Sciences	Engg Sciences	Humanities & Social Sciences		Program core	Program Electives	Open Electives		Project	Internships / 2 2 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		Soft Skills



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE11	Formal language and automata theory	Ту	3	0	0	3

Unit-I

INTRODUCTION: Introduction to language theory, tokens. Alphabets, definition of grammar, Production rules,

sentences, sentential forms, language definitions, derivations.-REGULAR LANGUAGES: Definition, Pumping Lemma of regular sets, Chomsky Hierarchy of languages.

Unit-II

FINITE AUTOMATA: Finite automaton, Deterministic, Non-Deterministic and their equivalence, Equivalence of regular expressions and FA. Moore and Mealy machines. **Unit-III** 9 hrs

CONTEXT FREE LANGUAGE: Relations between classes of languages, Context Free Grammar, Derivation trees, ambiguity simplification, Normal forms, applications.

Unit-IV 9 hrs PUSHDOWN AUTOMATA: Pushdown automata, definitions, context free languages, construction of PDA for simple CFLs, Linear bounded automata.

Unit-V

TURING MACHINES:Turing machines, Introduction to computability, Universal Turing Machines, Types of Turing Machines, Techniques for construction of Turing machines, Undesirability and Halting problem

REFERENCE BOOKS

1. Introduction To Automata Theory, Languages, And Computation by John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Publisher: Pearson

2. Z. Kohavi, Switching and Finite Automata Theory, Tata McGraw Hill, 2018.

3. E.V. Krishnamoorthy, Introductory Theory of Computer Science, Affiliated East West

Total Hrs:45 Hrs

9 hrs

9 hrs



Subject MCS20	Code : CEL11	Subject automation	t Name ta theor	e : For y lab	rmal langua	ge and		Ty/ Lb/ ETL	L	T/S Lr	P/R	С		
		Prerequ	isite : F	Princip	ples of Con	npiler De	esign	Lb	0	0	4	2		
L : Lect	ure T : Tu	torial S.I	Lr : Sup	ervise	ed Learning	g P : Proj	ect R:	Researc	ch C:	Credits				
T/L/ET	L : Theory	/ Lab / E	mbedde	ed Th	eory and La	ab								
OBJEC • Ad • Ab	CTIVES : equate kn ility to des	owledge ign abstr	to und act ma	erstai chine	nd abstract models to	t machir accept	ie mode various	els and formal	forma langu	il langu Jages.	ages			
COURS	URSE OUTCOMES (Cos) -													
Student	ents completing the course were able to													
CO1	Explain the basic concepts of finite automata and regular expressions.													
CO2	Analyze	he types	of gran	ımar a	and derivati	ion tree.								
CO3	Demonst	ate the c	oncepts	of gr	ammar. lan	guage								
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COs/PO	s PO1	PO2	PO3	PO	4 PO5	PO6	PO	7 PC)8	PO9	PO	10		
CO1	2	2	2	1	1	2	2	3		3	3			
CO2	2	2	2	1	1	2	2	3		3	3			
CO3	2	2	2	1	1	2	2	3		3	3			
COs/PS	Os				PS	01				PSO2				
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CO2 CO3					1	<u>l</u>				2 2				
CO2 CO3 CO4					1	l l				2 2 2				
CO2 CO3 CO4 CO5					1 1 1	<u> </u> 				2 2 2 2 2				
Coz Co3 CO4 CO5	Basic Sciences	Engg Sciences	Humanities & Social Sciences		Program core	Program Electives	Open Electives	Practical /	Project	Internships / 2 2 2 7 Technical Skills		Soft Skills		



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CEL11	Formal language and automata theory lab	Lb	0	0	4	2

- 1. Deterministic Finite Automata (DFA)
- 2. Nondeterministic Finite Automata (NFA)
- **3.** Conversion of NFA to DFA
- 4. DFA Minimization
- 5. DFA to regular grammar conversion
- **6.** Mealy machine
- 7. Moore Machines
- 8. Building Your First Pushdown Automaton
- 9. Converting a NPDA to a Context-Free Grammar
- **10.** Single tape Turing machine
- **11.** Multi-tape Turing machine
- 12. Converting Turing Machine to an Unrestricted Grammar
- **13.** Convert CFG to PDA (LL)
- **14.** Convert CFG to PDA (LR)
- **15.** Regular pumping lemma
- **16.** Context free pumping lemma
- 17. Transform Grammar



Subject	Code :	Subjec	t Name	: Digital	forensics	and	Ty/I	.b/ETL	L	T/S Lr	P/R	С
1100200		Prereau	usite :					Tv	3	0	0	3
L : Lectu	re T : Tut	orial S.L	r : Supe	ervised Le	arning P	: Projec	t R : Re	esearch C:	Cre	dits		
T/L/ETI	: Theory	/ Lab / E	mbedde	d Theory	and Lab	5						
OBJEC	TIVES :											
Т Т	To unders	tand the	basic	digital f	orensics	and te	chnique	s for con	duc	ting t	he foi	rensic
examin	ation on c	lifferent d	ligital de	evices.			••••••					•
Г	To underst	and how	to exar	nine digi	tal evide	nces suc	ch as the	e data acqu	isit	tion, ic	lentific	cation
analysi	s.			U				1		,		
COURS	SE OUTCOMES (Cos) : Students completing the course were able to											
COURS	SE OUTCOMES (Cos) : Students completing the course were able to											
CO1	Know how to apply forensic analysis tools to recover important evidence for identifying											
	computer crime.											
CO2	To be we	ell-trained	as next	-generati	on compu	ter crin	ne invest	igators.				
CO3	To analy	ze Evider	ice man	agement								
				-								
CO4	To demo	nstrate In	vestigat	ion attacl	KS							
			U									
CO5	To deal r	eal time c	yber se	curity iss	ues.							
Mappin	g of Cour	se Outco	mes wit	th Progra	am Outco	omes (P	Os)					
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P	09	PO	10
CO1	2	2	2	1	1	2	2	3		3	3	
CO2	3	1	2	3	2	2	2	2		2	2	
CO3	2	2	2	1	1	2	2	3		3	3	
CO4	3	1	2	3	2	2	2	2		2	2	
CO5	2	2	2	1	1	2	2	3		3	3	
COs/PS	Os				PSO1	-			P	SO2		
CO1					2					1		
CO2					1					2		
CO3					1					2		
CO4					2					1		
CO5	г – – т				1					2		
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					\checkmark							



Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE12	Digital Forensics and Investigation	Ту	3	0	0	3

UNIT-I

Foundations: Basic Principles and methodologies for digital forensics, Design systems with forensic needs in mind

UNIT-II 9 hrs Evidence Collection: Rules of Evidence, Jurisdictions, Chain of Custody 9 hrs

UNIT-III

Search and Seizure of evidence: legal and procedural requirements; Digital Evidence methods and standards, Techniques and standards for Preservation of Data

UNIT-IV

Evidence Analysis: OS / File System Forensics, Application Forensics, Web Forensics, Network Forensics, Mobile Device Forensics

UNIT-V

Investigation: Computer / Network / System attacks, Attack detection and investigation, Antiforensics

REFERENCE BOOKS

- 1. Thomas J Holt, Adam M Bossler, Kathryn C Seigfried-Spellar, Cybercrime and DigitalForensics: An Introduction, Routledge, 2016
- 2. Eoghan Casey, Handbook of Digital Forensics and Investigation, Academic Press, 2017
- 3. Eoghan Casey, Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet, III Edition, 2016
- 1. Angus McKenzie Marshall, Digital Forensics: Digital Evidence in Criminal Investigations, Wiley-Blackwell, 2018

TOTAL HOURS: 45Hrs

9 hrs

9 hrs



Subject	Code :	Subjec	ubject Name : Digital Forensics and Ty/Lb/ L T/S P/ C								
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		/ Lao / L	mocuue	d Theory							
OBJEC	111115:										
• 1	Demonstrat	te use of	digital f	orensics (tools						
• (Guide a dig	vital fore	uightaí í	ercise.							
• F	Recognize	the state	of the p	ractice an	d the gaps	s in tec	hnology.	policy, an	d legal	issue	s
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COURS	SE OUTC	OMES (Cos) :									
Students	completing the course were able to										
CO1	Perform l	n basic digital forensics.									
CO2	Guide a d	igital forensics exercise.									
CO3	Demonst	monstrate Tracing concepts									
CO4	To demon	nstrate In	vestigat	ion attacl	KS						
CO5	To deal re	eal time o	cyber se	curity iss	ues.						
Mappin	g of Cour	se Outco	mes wi	th Progra	am Outco	mes (I	POs)				
COs/PO	s PO1	PO2	PO3	PO 4	PO5	DO6	PO7	PO8	DOO	Т	2010
		104	PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10								
CO1	2	2	3	3	105	1	2	2	2		3
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CO1 CO2 CO3 CO4	$ \begin{array}{c c} \hline 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\$	102 2 1 1 2	$\begin{array}{c} 103\\ \hline 3\\ \hline 2\\ \hline 2\\ \hline \end{array}$	104 3 3 3 3 3	103 1 1 2 2	1 1 2 1	107 2 2 1 2	100 2 2 2 1	103 2 2 3		3 3 3 3
CO1 CO2 CO3 CO4 CO5	$\begin{array}{c} 2 \\ \hline \end{array}$	$ \begin{array}{r} 102 \\ 2 \\ 1 \\ 1 \\ 2 \\ 2 \end{array} $	$ \begin{array}{c} 103\\ 3\\ 2\\ 2\\ 1 \end{array} $	3 3 3 3 3 3 3	103 1 1 2 2 2 2	1 1 2 1 1 1	107 2 1 2 1 2 2	100 2 2 2 1	103 2 2 3 3		3 3 3 3 3 3
CO1 CO2 CO3 CO4 CO5 COs/PSC	2 2 2 2 2 2 2 2 2 2 2 2 2 3 8	$ \begin{array}{r} 102 \\ 2 \\ 1 \\ 1 \\ 2 \\ 2 \\ 2 \end{array} $	$\begin{array}{c} 103\\ \hline 3\\ \hline 3\\ \hline 2\\ \hline 2\\ \hline 1\end{array}$	3 3 3 3 3 3	1 1 2 2 2 PSO1	1 1 2 1 1 1	1 2 2 1 2 2 1 2 2 1	100 2 2 2 1 1	2 2 3 3 3 PSO2		3 3 3 3 3
CO1 CO2 CO3 CO4 CO5 COs/PSC CO1	2 2 2 2 2 2 2 2 2 2 2 2 3 8	102 2 1 2 2 2 2 2 2	103 3 2 2 1	3 3 3 3 3 3 3	1 1 2 2 2 PSO1 1	1 1 2 1 1	2 2 1 2 2	100 2 2 2 1	2 2 3 3 9 SO2 2		3 3 3 3 3
CO1 CO2 CO3 CO4 CO5 COs/PSC CO1 CO2	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 8	102 2 1 1 2 2	103 3 3 2 1	3 3 3 3 3 3	103 1 2 2 2 PSO1 1 1	1 1 2 1 1	2 2 1 2 2	100 2 2 2 1	2 2 2 3 3 3 PSO2 2 2 2		3 3 3 3 3
CO1 CO2 CO3 CO4 CO5 COs/PSC CO1 CO2 CO3	2 2 2 2 2 2 2 2 3 8	102 2 1 2 2 2	103 3 3 2 2 1	3 3 3 3 3 3	103 1 2 2 2 PSO1 1 1 1	1 1 2 1 1	2 2 1 2 2	100 2 2 2 1	2 2 2 3 3 3 PSO2 2 2 2 2 2		3 3 3 3 3
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CO1 CO2 CO3 CO4 CO5 COs/PSC CO1 CO2 CO3 CO4 CO5 CO4 CO5 CO3 CO4 CO5 CO3 CO4 CO5	2 2 2 2 2 2 2 2 2 2 2 2 2 3 8	102 2 1 1 2 2	103 3 2 2 1	104 3 3 3 3 3	103 1 2 2 2 PSO1 1 1 1 1 1 1 1 1 1 1 1	1 1 2 1 1		1 2 2 1	2 2 2 3 3 3 PSO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		3 3 3 3 3
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CO1 CO2 CO3 CO4 CO5 COs/PSC CO1 CO2 CO3 CO4 CO5 CO3/PSC CO1 CO2 CO3 CO4 CO5	2 2 2 2 2 2 2 2 3 8	2 1 1 2 2 2	3 3 2 2 1	3 3 3 3 3	103 1 2 2 2 PSO1 1 1 1 1 1 1 1 1	1 1 2 1 1		100 2 2 1	2 2 3 3 3 PSO2 3 3		3 3 3 3 3 3
CO1 CO2 CO3 CO4 CO5 CO3/PSC CO1 CO2 CO3 CO4 CO5	2 2 2 2 2 2 2 0s	2 1 1 2 2 2 2 2	3 3 2 1	3 3 3 3 3 Ces	103 1 2 2 2 1 1 1 1 1 1 1		SWW		2 2 2 3 3 3 PSO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		kills
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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CEL12	Digital Forensics and Investigation Lab	Lb	3	0	0	3

1. Computer Hardware Discovery.

2. Working in Windows and Linux Environment: Study of various commands in Linux like Encryption and Decryption, message digest etc.

3. MAC Dates and Times.

4. Tracing E-mail-Finding senders IP Address of received e-mail, tracing route of e-mail received using tools available on internet using Visual Trace Route.

5. Exploring Encase software.

6. Evidence Tags and Logs.

7. WinHex : Cloning a Disk, Recovering Digital Evidence, Analyzing Digital Evidence, Documenting Digital Evidence.

8. Locate a deleted mail using Forensic Tool Kit.



Subject MCS200	Code : CE13	Subjec	t Name :]	Internet (of Thing	gs	Ty/L	b/ET	LL	T/S Lr	P/R	C
	0210	Prerequ	isite : Bas	sics of Ne	etworks		r	Гy	3	0	0	3
L : Lectu	ure T : Tut	orial S.L	r : Superv	ised Lear	rning P	: Proje	ect R :	Rese	arch C:	Credits	1	
T/L/ETI	: Theory	/ Lab / Ei	mbedded 7	Theory a	nd Lab	U						
OBJEC	TIVES :											
• Des	cribe what	IoT is and	how it wor	ks today								
• Desi	ign and pro	gram IoT	devices									
• Trai	nster lol da	ata to the c	loud and in	i between	cloud p	rovide	rs					
COUDS		OMES (
Students	ents completing the course were able to											
Students												
CO1	Analysing and understanding the vision of IoT from a global context											
CO2	Can use devices like Raspberry PIInterfaces, Gateways and Data Management in IoT.											
CO3	Able to build architecture in IoT.											
CO4	Able to d	liscuss va	rious Iden	tity Man	agemen	t mod	els.					
CO5	Determin	e the Ma	rket perspo	ective of	IoT							
Mappin	g of Cour	se Outco	mes with	Program	n Outco	omes ((POs)					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO	6 P	07	PO8	PO9	I	PO10
CO1	3	1	2	3	2	2		2	2	2		2
CO2	2	2	2	1	1	3		3	2	1		2
CO3	3	1	2	3	2	2		2	2	2		2
CO4	2	2	2	1	1	3		3	2	1		2
CO5	3	1	2	3	2	2		2	2	2		2
COs/PSC)s				PSO	1				PSO2		
CO1					1					2		
CO2					2					1		
CO3					1			_		2		
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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE13	Internet of Things	Ту	3	0	0	3

Unit I IoT Web Technology

The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardisation, Recommendations on Research Topics.

Unit II IoT Applications for Value Creations

Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoTFor Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

Unit III Internet of Things Privacy, Security and Governance

Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security

Unit IV Architectural Approach for IoT Empowerment

Introduction, Defining a Common Architectural Ground, IoTStandardisation, M2M Service Layer Standardisation, OGC Sensor Web for IoT, IEEE, IETF and ITU-T standardization activities, Interoperability Challenges, Physical vs Virtual, Solve the Basic First, Data Interoperability, Semantic Interoperability, Organizational Interoperability, Eternal Interoperability, Importance of Standardisation, Plan for validation and testing, Important Economic Dimension, Research Roadmap for IoT Testing Methodologies. Semantic as an Interoperability Enabler and related work.

Unit V Identity Management Models in IoT

Introduction, Vulnerabilities of IoT, Security requirements, Challenges for a secure Internet of Things, identity management, Identity portrayal, Different identity management model: Local identity, Network identity, Federated identity, Global web identity, Identity management in Internet of Things, User-centric identity management, Device-centric identity management, Hybrid identity management.

REFERENCE BOOKS

- Dr. OvidiuVermesan, Dr. Peter Friess, Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, River Publishers, 2013, ISBN: 978-87-92982-96-4 (E-Book), ISBN: 978-87-92982-73-5 (Print)
- 2. Dr. ParikshitMahalle, Poonam Railkar, Identity Management for Internet of Thing, River Publishers, 2015, ISBN: 978-87-93102-91-0 (EBook), ISBN:978-87-93102-90-3(Hard Copy)
- 3.CunoPfister, Getting Started with the Internet of Things, O'Reilly Media, 2011, ISBN: 978-1-4493- 9357-1

9 hrs

9 hrs

9 hrs

9 hrs

9 hrs

TOTAL HOURS: 45 Hrs



Subject	Code : TE14	Subject	t Code :	: no			Ту	/Lb/ETL	L	T/S Lr	P/ R	С
1100200		Prerequ	isite : N	letwork	s			Tv	3	0	0	3
L : Lectu	re T : Tuto	rial S.Lr	: Super	vised L	earning	g P : Pro	oject R	: Research	C: Cr	edits	Ţ	-
T/L/ETL	: Theory /	Lab / En	nbedded	l Theory	y and L	ab	5					
OBJEC	TIVES :											
То	provide st	udents w	ith the f	undam	entals	and es	sential	s of Cloud	Compi	uting.		
	•								•	0		
• T	o provide	students	a soun	d found	dation (of the C	loud C	computing s	so that	they a	re ab	le to
S	tart using a	and adop	oting Clo	oud Co	mputin	ig servi	ces an	d tools in th	neir rea	al life s	cenai	ios.
• 1	o enable s	students	explorir	ng some	e impo	rtant clo	oud co	mputing dr	ven co	ommer	cial s	ystems
a a	nd applica	tions. the stude	onte to f	rontior	araac	of Clou	d Com	nuting and	inform	ation o	vetor	nc
• 1 W	hile provid	lina suffi	cient foi	undatio	areas	enable f	urther	study and	researd	ch	ysiei	115,
COURS	URSE OUTCOMES (Cos) :											
Students	completing	g the cour	rse were	e able to)							
CO1	Explain th	ne core c	oncept	s of the	cloud	compu	ting pa	radigm:				
CO2	how and	why this	paradic	m shift	came	about,	the ch	aracteristic	s, adva	antage	s and	
	challenge	es brough	nt about	, t by the	variou	is mode	els and	services ir	, cloud	comp	uting.	1
CO3	Apply the	fundame	ental co	oncepts	in dat	acenter	s to ur	derstand t	ne trad	eoffs i	n pov	ver,
	efficiency	and cos	t.									
CO4	Identify re	esource r	nanage	ement fi	undam	entals		L . (the s
005	Analyze \	arious c	ioua pro	ogramn	ning m	odels a	nd app	bly them to	solve p	probler	ns on	the
Mannin	of Cours	e Outcor	nes witl	h Progr	am Oi	itcome	(POs))				
COs/POs	$\frac{1}{1000} \frac{1}{10000000000000000000000000000000000$	PO2	PO3	PO4	PO5	PO6	PO7	/ PO8	Р	09	Р	010
CO1	2	2	2	1	1	3	3	2		1		2
CO2	3	1	2	3	2	2	2	2		2		2
CO3	3	1	2	3	2	2	2	2		2		2
CO4	2	2	2	1	1	3	3	2		1		2
CO5	2	2	2	1	1	3	3	2		1		2
COs/PSO	s]	PSO1				PSO2		
CO1						2				1		
CO2						1				2		
CO3						1				2		
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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	С
MCS20CE14	Cloud Computing	Ту	3	0	0	3

Unit – I

INTRODUCTION TO COMPUTING AND CLOUD COMPUTING: Trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing. Concept and Evolution of cloud computing paradigm. Business driver for adopting cloud computing. Benefits and challenges of cloud computing. Various types of cloud computing. Cloud Computing Architecture: Cloud delivery model, SPI framework, SPI evolution, SPI vs. traditional IT Model.

Unit – II

INFRASTRUCTURE AS A SERVICE (IAAS): IaaS service providers, Amazon EC2, GoGrid, Microsoft soft implementation and support, Amazon EC service level agreement, recent developments, Benefits.

SOFTWARE AS A SERVICE (SAAS): SaaS service providers, Google App Engine, Salesforce.com and google platfrom, Benefits, Operational benefits, Economic benefits, Evaluating SaaS. **PLATFORM AS A SERVICE (PAAS):** PaaS service providers, Right Scale, Salesforce.com, Rackspace, Force.com, Services and Benefits.

Unit – III

VIRTUALIZATION: Virtualization concept and Operating System, Need of virtualization, cost, administration, fast deployment, reduce infrastructure cost, limitations. Types of hardware virtualization: Full virtualization, partial virtualization, para virtualization. Desktop virtualization: Software virtualization, Memory virtualization, Storage virtualization, Data virtualization, Network virtualization. Microsoft Implementation: Microsoft Hyper V, VMware features and infrastructure, Virtual Box, Thin client.

Unit – IV

CLOUD DEPLOYMENT MODEL: Public clouds, Private clouds, Community clouds, Hybrid clouds, Advantages of Cloud computing, Performance and Resource management, load balancing, Energy model.

Unit – V

BEST PRACTICE CLOUD IT MODEL: Analysis of Case Studies when deciding to adopt cloud computing architecture, How to decide if the cloud is right for your requirements. Cloud based service, applications and development platform deployment so as to improve the total cost of ownership (TCO), Security aspects in cloud.

REFERENCE BOOKS

- 1. Barrie Sosinky, *Cloud Computing*, Wiley Publishing House, 2011.
- 2. Michael J. Kavis, Architecting the cloud: Design decision for cloud computing, John Wiley & Sons, 2017.
- 3. Anthony T.Velte, Toby J. Velte& Robert Elsenpeter, *Cloud computing a practical approach*, MGH, 2016.
- 4. Thomas Erl, Ricardo Puttini, *Cloud Computing: Concepts, Technology & Architecture*, Prentice Hall, Pearson Publications, 2016.

9 hrs

9 hrs

9 hrs

9 hrs

9 hrs

TOTAL HOURS: 45



Subject MCS200	Code : CE15	Subject	t Name	: Gam	e Theor	y 1	ſy/Lb/ETI	_	L	T/S Lr	P/R	С			
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CO4	Image: Think strategically in many situations														
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Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences		Program core	Program Electives	Open Electives	Practical /	riujeci	Internships / Technical Skills		Soft Skills			
					 										



Unit I

Subject

Code MCS20CE1

5

1 Introduction and Outline of the Course, Definitions, Utilities, Rationality, Intelligence, Common

Knowledge, Classification of Games

Unit II

I. NON-COOPERATIVE GAME THEORY Extensive Form Game Strategic Form Games with

Illustrative Examples Dominant Strategy Equilibria Pure Strategy Nash Equilibrium with Illustrative

Examples and Key Results Mixed Strategy Nash Equilibrium with Illustrative Examples and Key

Results such as the Nash Theorem

Unit III

Computation of Nash Equilibria and introduction to algorithmic theory Matrix Games: Saddle Points,

Minimax Theorem Bayesian Games, Bayesian Nash Equilibrium Evolutionary Game Theory (ESS

Strategies) Repeated Game

Unit IV

MECHANISM DESIGN The Mechanism Design Environment Social Choice Functions with Illustrative Examples Implementation of Social Choice Functions Incentive Compatibility and Revelation Theorem.

Unit V

Gibbard-Satterthwaite and Arrow Impossibility Theorem Vickrey-Clarke-Groves (VCG) Mechanisms Bayesian Mechanisms (dAGVA) Revenue Equivalence Theorem Myerson Optimal Auction Further Topics in Mechanism Design

Unit VI

PART III: COOPERATIVE GAME THEORY Correlated Strategies and Correlated Equilibrium

The Nash Bargaining Problem Coalitional Games (Transferable Utility Games) The Core The Shapley Value Other Solution Concepts: Kernel, Nucleolus To Probe Further and Conclusion

Reference Books

1. Martin J. Osborne. An Introduction to Game Theory. Oxford University Press. Indian Edition,

2016.

2. Roger B. Myerson. Game Theory: Analysis of Conflict. Harvard University Press, 2018.

3. Y. Narahari, Dinesh Garg, RamasuriNarayanam, Hastagiri Prakash.

4. Game Theoretic Problems in Network Economics and Mechanism Design Solutions. Springer, London, 2017.

NPTEL/Open Course

1. http://lcm.csa.iisc.ernet.in/gametheory/index.html

(DEEMED TO BE UNIVERSITY) (An ISO Certified Institution) University with Graded Autonomy Status Maduravoval, Chennai - 600 095 M.TECH – COMPUTER SCIENCE AND ENGINEERING

Dr.M.G.R. **Educational and Research Institute**

Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	
Game Theory	Ту	3	0	0	

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3

9 hrs

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9 hrs

TOTAL HOURS: 45

9 hrs



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Audit Course I & II



Prerequisite: Nil TY 2 0 0 0 L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab 0	Subject Code: MET20AU01		Su PA	bject Na PER W	ame EN RITIN	GLISH G	FOR	RESE.	ARCH	Ty/I	Lb/ET L	L	Т	I		С	
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Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20AU01	English for Research Paper Writing	TY	2	0	0	0

Units 1

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit 2

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts .Introduction 6 hrs

Unit 3

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check. 6 hrs Unit 4

Key Skills are needed when writing a Title, Abstract, Review of the Literature, Methods, Results, Discussion and conclusion

Unit 5

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Reference Books:

TOTAL HOURS: 30Hrs

- 1. Goldbort R (2016) Writing for Science, Yale University Press (available on Google Books)
- Day R (2016) How to Write and Publish a Scientific Paper, Cambridge University 2. Press
- 3. Highman N (2018), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
- Adrian Wallwork, English for Writing Research Papers, Springer New York 4. Dordrecht Heidelberg London, 2017



6 hrs



Subject Code: MET20AU02		Sul MA	bject N ANAGI	ame D EMENT	ISAS' [TER			Ty/	/Lb/E TL	L	Т	Р	С	
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Maduravoval, Chennai - 600 095 M.TECH – COMPUTER SCIENCE AND ENGINEERING

Dr.M.G.R. **Educational and Research Institute** (DEEMED TO BE UNIVERSITY) (An ISO Certified Institution) University with Graded Autonomy Status

Audit course I&II

Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20AU02	Disaster Management	Ту	2	0	0	0

Unit I

INTRODUCTION TO DISASTERS

Concepts, and definitions-Disaster, Hazard, Vulnerability, Resilience, Risks Disasters: Classification, Causes, Impacts -including social, economic, political, environmental, health, psychosocial, etc.

Unit II

RISK MANAGEMENT

Goals and objectives of ISDR Programme- Risk identification – Risk sharing – Disaster and development: Development plans and disaster management -Alternative to dominant approach -disaster-development linkages - Principle of risk partnership.

Unit III

RISK REDUCTION

Trigger mechanism – constitution of trigger mechanism – risk reduction by education – disaster information network – risk reduction by public awareness Application of various technologies: Data bases - RDBMS - Management Information systems - Decision support system and other systems - Geographic information systems Remote sensing-an insight contribution of remote sensing and GIS - Case study.

Unit IV

INTER-RELATIONSHIPS BETWEEN DISASTERS AND DEVELOPMENT:

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources financial arrangements areas of improvement -disaster preparedness - emergencyresponse

Unit V

DISASTER RISK MANAGEMENT IN INDIA

Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)

Text Books:

1. Pardeep Sahni, Madhavi Malalgoda and Ariyabandu, "Disaster risk reduction in South Asia", PHI

2. Amita Sinvhal, "Understanding earthquake disasters" TMH, 2010.

References:

3. Pardeep sahni, Alka Dhameja and Uma Medury, "Disaster mitigation: Experiences and reflections", PHI

6 Hrs

6 Hrs

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TOTAL HOURS: 30 Hrs



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Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
	Sanskrit for Technical	Ту	2	0	0	0
WIE 120A003	Knowledge					

Unit I

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

Unit II

Order, Introduction of roots, Technical information about Sanskrit Literature

Unit III

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

TOTAL HOURS : 30 HRS

Reference Books:

1. "Abhyaspustakam" - Dr. Vishwas, Samskrita-Bharti Publication, New Delhi

2. "Teach Yourself Sanskrit" Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

10 hrs

10 hrs





Subject Cod MET20AU0	le: 4	Subject VALUE	Name EDUC	ATI	ON			Ty/I ET	Lb/ L	L	Т	Р	С
		Prerequi	site: Nil					T	у	2	0	0	0
L : Lecture	Γ: Tuto	ial P:	Project	R : 1	Resea	arch C:	Credi	ts T/L:	Theo	ory/La	b		
Objectives .	Underst	and valu	e of edu	catic	on an	d self-	develo	pment	, Imł	bibe g	ood v	alues	in
students . Le	t them s	hould kr	low abou	ut th	e imp	oortanc	e of ch	aracter	•				
COURSE C	UTCO	MES (C	Os): A	t the	e end	of this	s cours	se the s	tude	ents w	ould	be al	ble to
CO1	Knowl	edge of s	elf-deve	elopr	nent								
CO2	Learn	he impo	rtance of	f Hu	man	n values							
CO3	Develo	ping the	overall	pers	onali	ty							
Mapping of	Course	Outcon	nes with	n Pro	ograr	n Outc	omes	(POs)					
COs/POs	PO1	PO2	PO3	P	04	PO5	PO	6 PO	7	PO8	P	09	PO10
CO1	1	1	1	1		1	3	1		1	1		1
COI	1	1	1	1		1	5	1		1	1		1
CO2	1	1	1	1		1	3	1		1	1		1
CO3	1	1	1	1		1	3	1		1			
COs / PSOs		PS	501						PS	502			
CO1			1							1			
CO2			1							1			
CO3			1							1			
H/M/L indi	cates St	rength o	f Corre	latio	on I	H- Hig	h, M-	Mediu	m, L	-Low			
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	 Audit course 			



Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20AU04	Value Education	Ту	2	0	0	0

Unit 1:

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgments

Unit 2:

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

Unit 3:

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance.

Unit 4:

True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit 5:

Character and Competence –Holy books vs Blind faith. Self-management and Good health.Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

TOTAL HOURS : 30 hrs

Reference:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

6 Hrs

6 Hrs

6 Hrs

6 Hrs

6Hrs



Subject Code MET20AU05	e: 5	Su IN	bject I DIA	Name :	CON	STIT	UTIO	N OF	Ty E	/Lb/ TL	L	Т	Р		С
		Pre	erequis	ite: Nil						Гу	2	0	0		0
L : Lecture T	: Tut	orial	P:Pr	oject F	R : Res	earch (C: Cree	lits T/I	: Theo	ry/Lab)				
Objectives U	Inders	stand t	he prer	nises ii	nformi	ng the	twin tł	nemes	of liber	ty and	freed	om fre	om a ci	vil r	rights
perspective.	Го ado	dress t	he grov	wth of	Indian	opinio	n rega	rding n	nodern	Indian	intel	lectua	ls'		
constitutional	l role	and er	titleme	ent to c	ivil an	d econ	omic r	ights a	s well a	as the e	merg	ence of	of natio	onho	od in
the early year	s of I	ndian	nation	alism T	'o addr	ess the	role c	of socia	lism in	India	after t	the co	mmeno	ceme	ent of
the Bolshevik	K Revo	olution	1 in 19	$\frac{\Gamma}{and}$	<u>1ts 1mp</u>	bact on	the in	itial dra	afting of	of the li	ndian	Cons	titutior	1.	
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CO2	Disc	cuss th	e intell	lectual	origin	s of the	frame	work o	of arou	ment th	nat inf	orme	d the		
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CO3	. Dis	scuss t	he circ	umstar	nces su	rround	ing the	e found	lation of	of the C	Congre	ess So	cialist	Part	ty
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	dire	ct elec	tions th	hrough	adult	suffrag	e in th	e India	n Cons	stitution	1.				
CO4	Disc	cuss th	e passa	age of t	he Hir	ndu Co	de Bill	l of 195	56.						
Mapping of	Cour	se Ou	tcomes	s with]	Progra	am Ou	tcome	s (POs)						
COs/POs		PO1	PO2	2 P	03	PO4	PC	05 1	PO6	PO7	PC)8	PO9	I	PO10
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Unit 1: **History of Making of the Indian Constitution:**

History Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble Salient Features

Unit 2:

Contours Of Constitutional Rights & Duties:

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy and Fundamental Duties.

Unit 3:

ORGANS OF GOVERNANCE:

Parliament Composition, Qualifications and Disqualifications, Powers and Functions Executive President, Governor Council of Ministers, Judiciary, Appointment and Transfer of Judges, Oualifications Powers and Functions.

Unit 4:

Local Administration:

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit 4: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners.State Election Commission: Role and Functioning.Institute and Bodies for the welfare of SC/ST/OBC and women.

Reference Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.

2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

M.TECH – COMPUTER SCIENCE AND ENGINEERING Audit course I&II

Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20AU05	Constitution of India	Ту	2	0	0	0

6 hrs

6 hrs

6 hrs

TOTAL HOURS: 30 hrs







Subject Cod MET20AU00	e: 5	Sı P	ıbject EDAG	Name : OGY S	STUD	TUDIES Ty/Lb/ L T P C												
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L : Lecture T	: Tuto	rial	$\mathbf{P}:\mathbf{P}$	roject I	R : Res	search	C: C	redits	T/L:	Theo	ory/La	ab	_					
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COURSE OUTCOMES (COs): At the end of this course the students would be able to know																		
CO1	What classr	ped	lagogic 15 in de	al pract	tices a	e beir	ng use ?	ed by	teach	ers ir	n form	nal an	id in	forma	.1			
CO2	What	That is the evidence on the effectiveness of these pedagogical practices, in what onditions, and with what population of learners?																
conditions, and with what population of learners? CO3 How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?																		
Mapping of Course Outcomes with Program Outcomes (POs)																		
COs/POs	PO)1	PO2	PO3	PO4	Р	05	PO6	PO7	PC	3 8	PO9		1	PO10)10		
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CO2	1	l	1	1	1		1	3	1]	1	1	1					
CO3	1	l	1	1	1		1	3	1	1	1	1	1					
COs / PSOs	5		PS	501							PS	02						
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CO3				1							1	l						
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Category		Dasic ociences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives Open Electives Practical / Project Internships / Technical Skill Soft Skills Audit course												
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Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20AU06	Pedagogy Studies	Ту	2	0	0	0

Unit I: Introduction and Methodology:

Aims and rationale, Policy background, Conceptual framework and terminology ,Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

Unit II:

Thematic overview:

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Unit III: Evidence on the effectiveness of pedagogical practices

Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit IV: Professional development:

Alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes.

Unit V: Research gaps and future directions:

Research design, Contexts, Pedagogy, Teacher education, Curriculum and Assessment, Dissemination and research impact.

Reference Books:

- 1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
- **2.** Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
- **3.** Akyeampong K (2003) Teacher training in Ghana does it count? Multi-site teacher Education research project (MUSTER) country report 1. London: DFID.
- **4.** Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
- **5.** Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
- 6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
 - www.pratham.org/images/resource%20working%20paper%202.pdf.

Audit course I&II

M.TECH –COMPUTER SCIENCE AND ENGINEERING REGULATION – 2020

TOTAL HOURS: 30 Hrs

6 hrs

6 hrs

6 hrs

6 hrs



Subject Co MET20AU	ode: J07	de: Subject Name: Ty/Lb 07 STRESS MANAGEMENT BY /ETL VOGA VOGA									С					
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CO2	Gair	Jain knowledge on Ashtanga yoga														
CO3		To Understand stress and the causes														
CO4		O Understand stress and the causes														
CO5	Atta	Acquire knowledge of Techniques and Practice of Yogasanas														
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Mapping o	of Co	urs	e Out	comes	witł	n Pro	gran	1 Out	comes	5 (PO	s)					
COs/POs	PC)1	PO2	PC)3	PC	04	PO5	PC)6	PO7	P) 8	F	PO9	PO10
CO1	1		1	1		1		1	3		1	1		1		1
CO2	1		1	1		1		1	3		1	1		1		1
CO3	1		1	1		1		1	1		1	1		1		1
CO4	1		1	1		1		1	3		1	1		1		1
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COs/PSOs					PS0	01							1	150	2	
CO1					1									1		
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Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20AU07	Stress Management by Yoga	TY	2	0	0	0

Unit 1:

What is stress - Symptoms of stress - Why is stress helpful - Why is stress harmful -Stress versus burnout - Main types of stress - Know your stressors - Tips to Manage Stress

Unit 2:

Strength, Weaknesses, Opportunities and Threats (SWOT) Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem. Emotional Intelligence, What is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales. **Managing Emotions**

Unit 3:

What is Yoga - Definition and Its Branches - Hatha Yoga - Kundalini Yoga - Tantra Yoga -Kriva Yoga – Introduction To Ashtanga Yoga

Unit 4:

Mechanism of Stress related diseases: Psychic, Psychosomatic, Somatic and Organic phase. of Meditation & Pranayama on stress - physiological aspect of Meditation. Constant Role stress & strain, anxiety, conflicts resulting in fatigue among Executive. Contribution of Yoga to solve the stress related problems of Executive

Unit 5:

Meaning and definition of Health - various dimensions of health (Physical, Mental, Social and Spiritual) - Yoga and health - Yoga as therapy. Physical fitness. Stress control exercise -Sitting meditation, Walking meditation, Progressive muscular relaxation, Gentle stretches and Massage.

TOTAL HOURS : 30 Hrs

Reference Books:

- 1. Andrews, Linda Wasmer., (2005). Stress Control for peace of Mind. London: Greenwich Editions Lalvani, Vimla., (1998). Yoga for stress. London: Hamlyn
- 2. Nagendra, H.R., and Nagarathana, R., (2004). Yoga perspective in stress management. Bangalore: Swami Vivekananda Yoga Prakashana.
- 3. Nagendra, H.R., and Nagarathana, R., (2004). Yoga practices for anxiety & depression. Bangalore: Swami Sukhabodhanandha Yoga Prakashana.
- 4. Sukhabodhanandha, Swami., (2002). Stress Management. Banglore: Prasanna trust.
- 5. Udupa, K.N., (1996). Stress management by Yoga. NewDelhi: Motilal Banaridass Publishers Private Limited

M.TECH – COMPUTER SCIENCE AND ENGINEERING **REGULATION – 2020**

6 hrs

6 hrs

6 hrs

6 hrs



Subject Co MET20AU	ode: 108	Si D L Si	ubject EVEI IFE E KILL	t Nam LOPM ENLIC S	e PEI IENT GHTE	RSON THR NME	ALI OU(NT	TY GH	Ty/I /ET	.b L	L	Т	Р		С
		Pı	rerequ	isite: l	Nil				Ту		2	0	0		0
L : Lecture	Т:Т	Futor	ial P	' : Proj	ject R	R : Res	earcl	h C: Ci	redits T/	′L: `	Theor	y/Lał)		
Objectives	To l	earn ality :	to ach and de	ieve th	ne hig	hest g	oal h wake	appily	, To be	com	e a p	erson	with	ı stab	le mind,
COURSE OUTCOMES (COs) : At the end of this course the students would be able to know															
CO1	Stu and	tudy of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life													
CO2 The person who has studied Geeta will lead the nation and mankind to peace and prosperity												ce and			
CO3	Stu	tudy of Neetishatakam will help in developing versatile personality of students.									dents.				
Mapping o	of Co	Course Outcomes with Program Outcomes (POs)													
COs/POs	P	PO1	PO	2 I	203	PO4	Ļ	PO5	PO6	Р	07	PO8		PO9	PO10
CO1	1		1	1		1	1	1	3		1	1	1		1
CO2	1		1	1		1	1	1	3		1	1	1		1
CO3	1		1	1		1	1	1	3		1	1	1		1
COs / PSOs	;			PSO1							P	502			
CO1				1								1			
CO2				1								1			
CO3				1								1			
H/M/L ind	licate	es Sti	ength	n of Co	orrela	ition	H-	High,	M- Meo	liur	n, L-]	Low			
		seou	හ	s and	Core	Electives	ctives	Peen Electives ractical / Project termships / oft Skills udit course udit course							
Category	(Basic Scier	Engineerin	Humanitie Social Soci	Program (Program I	Open Ele	Practical	Internshif Technical	Soft Skill	Audit con				

Dr.M.G.R. **Educational and Research Institute** (DEEMED TO BE UNIVERSITY) (An ISO Certified Institution) University with Graded Autonomy Status Maduravoval, Chennai - 600 095

Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20AU08	Personality Development through life Enlightenment Skills	Ту	2	0	0	0

Unit 1:

Neetisatakam-Holistic development of personality

Verses- 19,20,21,22 (wisdom) Verses- 29,31,32 (pride & heroism)Verses- 26,28,63,65 (virtue) Verses- 52,53,59(dont's)Verses-71,73,75,78(do's)

Unit 2:

Approach to day to day work and duties.

Shrimad BhagwadGeeta: Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48. Unit 3: 10 hrs

Statements of basic knowledge.

Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16, 17, 18 Personality of Role model. Shrimad BhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter 18 – Verses 37,38,63

Reference Books:

- 1. "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata
- 2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

TOTAL HOURS : 30 Hrs



10 hrs



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Please Turn Over



Open Elective



Subject	S	ubject	t Name	BUSI	NESS	Ty/L	т	т	р			~		
Code: MET200E	A	INAL 1	rncs			D/E I	L	1	P		, c			
WIL1200L	P	rereau	isite [.] N	il			3	0	0			3		
L. Lectur	e T · Tı	torial	$P \cdot Pr$	n oiect I	R · Resea	rch C: Ci	edit	s T/I	: The	orv/I	ab	5		
Objective	es. Un	derstan	d the ro	ole of b	usiness a	nalytics v	with	in an	orgar	nizati	on. And	alvze data		
using stat	istical a	nd data	a minin	g techn	iques an	d underst	and 1	relati	onshi	ps be	tween th	he		
underlyin	g busine	ess pro	cesses o	of an or	rganizati	on. To ga	in ar	n und	erstar	ding	of how	managers		
use busine	ess anal	ytics to	o formu	late an	d solve b	usiness p	roble	ems a	and to	supp	oort mar	nagerial		
decision r	decision making. To become familiar with processes needed to develop, report, and analyze business data. Use decision-making tools/Operations research techniques. Mange business													
business data. Use decision-making tools/Operations research techniques. Mange business														
process using analytical and management tools. Analyze and solve problems from different														
industries such as manufacturing, service, retail, software, banking and finance, sports,														
pharmaceutical, aerospace etc.														
COURSE OUTCOMES (COs): At the end of this course the students would be able to														
CO1 Students will demonstrate knowledge of data analytics. Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.														
CO2	Studen	ts will	demon	strate f	he ability	to use te	chni	ical s	kills i	n pre	dicative	and and		
002	prescri	intive r	nodelin	g to su	pport bu	siness dec	cisio	n-ma	king.	n pre	areative	und		
CO3	Studen	ts will	demon	strate t	he ability	to transl	ate c	lata i	nto cl	ear, a	actionab	le insights		
Mapping	of Cou	rse Ou	utcome	s with	Program	1 Outcon	nes (POs)			0		
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6		PO7	PO	3 8	PO9	PO10		
CO1	3	3	3	3	3	1		1	1		3	3		
CO2		_			-									
	3	3	3	3	3	1		1	1		3	3		
CO2	3	33	3	3	3	1		1	1		3 3	3 3		
CO3 COs/	3	3 3 F	3 3 PSO1	3	3	1		1 1	1 1 PSO 2	2	3 3	3 3		
CO3 COs / PSOs	3 3	3 3 F	3 3 PSO1	3	3	1		1 1	1 1 PSO 2	2	3	3		
CO2 CO3 COs / PSOs CO1	3 3	3 3 F	3 3 PSO1 3	33	3	1		1	1 1 PSO 2 3	2	3 3	3		
CO3 COs / PSOs CO1 CO2	3 3	3 3 F	3 3 PSO1 3 3	3 3	3	1		1	1 1 PSO2 3 3	2	3 3	3 3		
CO3 COs / PSOs CO1 CO2 CO3	3 3	3 3 F	3 3 PSO1 3 3 3	3 3	3 3	1		1	1 1 PSO2 3 3 3	2	3 3	3 3		
CO3 COs / PSOs CO1 CO2 CO3 H/M/L in	3 3	3 3 F	3 3 PSO1 3 3 3 gth of 0	3 3 Correl	3 3 ation H	1 1 H- High, 1	M- N	1 1 Medi	1 1 PSO2 3 3 3 um, I	2 2-Lo	3 3 w	3		
CO3 COs / PSOs CO1 CO2 CO3 H/M/L in	3 3 dicates	3 3 F	3 3 2*SO1 3 3 3 gth of 0	3 3 Correl:	3 3 ation I	1 1 H- High, 1	M- N	1 1 Vledi	1 1 PSO2 3 3 3 um, I	2 Lo	3 3 w	3		
CO3 COs / PSOs CO1 CO2 CO3 H/M/L in	3 3	3 3 F	3 3 2801 3 3 3 gth of 0	3 3 Correls	ation H	1 1 H- High, 3	M- N	1 1 VIedi	1 1 PSO2 3 3 3 um, I	2 Lo	3 3 w	3		
CO3 COs / PSOs CO1 CO2 CO3 H/M/L in	3 3 dicates	3 3 s Stren	3 3 2501 3 3 3 3 3 3 9th of 0	3 3 Correl:	3 3 ation I	I I H- High, J	M- N	1 1 Vledi	1 1 PSO2 3 3 3 um, I	2 Lo	3 3 w	3		
CO3 COs / PSOs CO1 CO2 CO3 H/M/L in	3 3 dicates	3 3 F Stren	3 3 Solution and 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 Correl:	ation I Electives	I I H- High, J	ups/ cal Skill	1 1 Medi	1 1 PSO2 3 3 3 um, I	2 Lo	3 3 w	3		
CO3 COs / PSOs CO1 CO2 CO3 H/M/L in	3 3 dicates	3 3 Stren	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 Correl:	gram Electives	1 1 H- High, I	interior in the second se	1 1 Medi	1 PSO2 3 3 3 um, I	2 Lo	3 3 w	3		
CO3 COs / PSOs CO1 CO2 CO3 H/M/L in	3 3 ddicates	Engineering Sciences	Humanities and 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 Correl:	Program Electives Open Electives	H-High,	Internships/ Technical Skill	1 1 Soft Skills	Andit course	2 Lo	3 3 w	3		
CO3 COs / PSOs CO1 CO2 CO3 H/M/L in	3 3 ddicates	Engineering Sciences	Humanities and Social Sciences Program Core	3 3 Correl:	Program Electives	1 1 H-High, 1	Internships/ Technical Skill	1 1 Soft Skills	1 1 1 PSO2 3 3 3 3 um, I	2 Lo	3 3 w	3		


Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20OE01	Business Analytics	TY	3	0	0	3

Unit1: Business analytics:

Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation. Descriptive Statistical methods. Review of probability distribution and data modelling, sampling and estimation methods overview.

Unit 2: Trendiness and Regression Analysis:

Modelling Relationships and Trends inData, simple Linear Regression.Important Resources, Business Analytics Personnel, Data and models for

Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

Unit 3: Organization Structures of Business analytics

Team management, Management Issues, Designing Information Policy, Outsourcing, EnsuringData Quality, Measuring contribution of Business analytics. ManagingChanges.Descriptive Analytics, predictive analytics, predicative Modelling, Predictiveanalytics analysis, Data Mining, Data Mining Methodologies, Prescriptiveanalytics and its step in the business analytics Process, PrescriptiveModelling, nonlinear Optimization. 9 hrs

Unit 4: Forecasting Techniques:

Qualitative and Judgmental Forecasting, StatisticalForecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, TimeSeries with Seasonality, Regression Forecasting Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation UsingAnalytic Solver Platform, New-Product Development Model, NewsvendorModel, Overbooking Model, Cash Budget Model.

Unit 5: Decision Analysis:

Formulating Decision Problems, Decision Strategies withthe without Outcome Probabilities, Decision Trees, The Value ofInformation, Utility and Decision Making.Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

Total No. of Hours: 45 Hrs

Reference Books:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G.Schniederjans, Christopher M. Starkey, Pearson FT Press.

2. Business Analytics by James Evans, persons Education.

M.TECH – COMPUTER SCIENCE AND ENGINEERING **REGULATION – 2020**

9 hrs

9 hrs

9 hrs

9 hrs



Subject Code MET20OE02	Subject Code:Subject Name INDUSTRIAL SAFETMET200E02							AFET	Y	Ty/I ET	.b/ L	L	Т	I		С
		Pr	rerequis	site: Nil						Ту	/	3	0	()	3
L : Lecture T	: Tuto	rial	P:Pr	oject R	Res	earch	C: Cre	edits 🛛	[/L:	Theor	y/Lal	5	1			
Objectives .	Under	stan	d polic	ies and	protec	tions _l	put in	place	to e	ensure p	olant	and fa	actor	y worl	ker	
protection from	m haza	ards	that co	uld caus	se inju	ry.										
COURSE OU	U TCO	ME	S (CO	s): At	the en	d of t	his co	urse t	he	studen	ts wo	ould b	oe ab	le to		
CO1	The different safety measures followed in the industry Understand the fundamentals of safety policy															
CO2	Unde	rstai	nd the f	fundame	entals	of safe	ety pol	icy								
CO3	To understand the periodic and preventive maintenance															
Mapping of (Course	e Ot	itcome	s with F	Progra	ım Ot	itcom	es (P	Ds)							
COs/POs	PO	l	PO2	PO3	PO4	P	05	POe	5	PO7	7	PO	3	PO9		PO10
CO1	3		3	3	3		3	1		1		1		3		3
CO2	3		3	3	3		3	1		1		1		3		3
CO3	3		3	3	3		3	1		1		1		3		3
COs / PSOs]	PSC	01	PS	02											
CO1		3		3	3											
CO2		3		3	3											
CO3		3		3	3											
H/M/L indica	ates St	ren	gth of (Correla	tion	H- H	igh, N	/I- Me	ediu	ım, L-l	Low					
										kill						
Category		Dasic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives			Internships / Technical Sk	Soft Skills	Audit course				



Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20OE02	Industrial Safety	Ту	3	0	0	3

Unit-I: Industrial safety:

Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Unit-II: Fundamentals of maintenance engineering:

Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-III: Wear and Corrosion and their prevention:

Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-IV: Fault tracing:

Fault tracing-concept and importance, decision tree concept, need and

applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-V: Periodic and preventive maintenance:

Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference Books:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.

- 2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
- 3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
- 4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

TOTAL HOURS :45 Hrs

9 hrs

9 hrs

9 hrs

9 hrs

9 hrs



Subject Cod MET20OE	le: .03	(Sul Operat	o ject I ions I	Name Resea		Ty/Lb/ ETL	L	Т	Р	С				
			Prer	equisi	ite: Nil			Ту	3	0	0	3			
L : L	ecture	T : Tuto	orial F	: Pro	ject R	: Re	esearch	C: Credits	T/L: 7	Theory	/Lab				
Objectives	Objectives To understand the process of Optimization Techniques and Operations Research														
COURSE O	COURSE OUTCOMES (COs): At the end of this course the students would be able to														
CO1	CO1 understand Strategic of Inventory Control Models CO2 To Import the process of constituities Analysis														
CO2		To know the process of sensitivity Analysis													
CO3		To familiarize Elementary Graph Theory													
	Map	ping of	Course	Outo	comes v	vith	Progra	am Outco	mes (l	POs)					
COs/POs	PO1	PO2	PO3	РО	4 PC	05	PO6	PO7	PO8	P)9	PO10			
CO1	3	3	3	3	2	2	1	1	1	2	2	2			
CO2	3	3	3	3	2	2	1	1	1	-	2	2			
CO3	3	3	3	3	2	2	1	1	1		2	2			
COs / PSOs			Р	SO1]	PSO2					
CO1				2						2					
CO2				2						2					
CO3				2						2					
H/N	1/L ind	licates \$	Strengt	h of C	Correla	tion	h H-H	Iigh, M- N	Aediu	m, L-]	Low				
Category	Basic Sciences Engineering Sciences Humanities and Social Sciences Program Core Program Electives Open Electives				Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course						
							\checkmark								



Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET200E03	Operations Research	Ту	3	0	0	3

Unit 1:

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit 2

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Unit 3:

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit 4

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit 5

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

- 1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
- 2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
- 3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
- 4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
- 5. Pannerselvam, Operations Research: Prentice Hall of India 2010
- 6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

9 hrs

TOTAL HOURS: 45Hrs

9 hrs

9 hrs

9 hrs

9 hrs



Subject Co MET20OE	Code: Subject Name DE04 COST MANAGEMENT OF ENGINEERING PROJECTS									Ty/ Lb/ ETL	L	Т	Р	С
		Pr	erequi	site: Ni	1					Ту	3	0	0	3
L : Lecture	T : T	utoria	al P:	Projec	tR:	Res	search	C: Cı	edits	T/L: T	heory	/Lab		
Objectives business.	To u	inder	stand t	he proc	ess o	of pla	annin	g and o	contro	olling th	ne buo	lget o	f a pro	ject or
COURSE	OUT	CON	1ES (C	COs) :	At th	ie ei	nd of	this co	ourse	the stu	ident	s wou	ld be	able to
CO1	CO1 understand Strategic Cost Management Process CO2 Know Cost concepts in decision-making in their projects													
CO2	Know Cost concepts in decision-making in their projects													
CO3	Tof	To familiarize Quantitative techniques for cost management												
Mapping o	f Cou	irse	Outco	nes wi	th Pr	ogr	am O	utcon	nes (F	POs)				
COs/POs	1	PO1	PO2	PO3	РО	4	PO5	PO6	PO	D7 I	PO8	PO	9	PO10
CO1		3	3	3	3		2	1	1		1	2		2
CO2		3	3	3	3		2	1	1	l	1	2		2
CO3		3	3 3 3 2 1 1 1 2 2							2				
COs / PSO	s			PS	01						P	SO2		
CO1					2							2		
CO2					2							2		
CO3					2							2		
H/M/L ind	icates	s Stro	ength	of Cor	relati	ion	H-I	High, I	M- M	ledium	, L-L	ow		
Category	Category Basic Sciences Engineering Sciences Humanities and Social Sciences Program Electives Program													

M.TECH –COMPUTER SCIENCE AND ENGINEERING REGULATION – 2020





Dr.M.G.R. **Educational and Research Institute**

Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20OE04	Cost Management of	Ту	3	0	0	3
	Engineering Projects					

Unit 1: Introduction:

Introduction and Overview of the Strategic Cost Management Process

Unit II: COST CONCEPTS IN DECISION-MAKING

Relevant cost, Differential cost, Incremental cost and Opportunity cost, Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit III: PROJECT:

Meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit IV: COST BEHAVIOUR AND PROFIT PLANNING MARGINAL COSTING: 9 Hrs

Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit V: QUANTITATIVE TECHNIQUES FOR COST MANAGEMENT: 9 Hrs

Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

Total No. of Hours: 45 Hrs

Reference Books:

- 1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
- 2. Charles T. Horngren and George Foster, Advanced Management Accounting
- 3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
- 4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
- 5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

9 Hrs

M.TECH – COMPUTER SCIENCE AND ENGINEERING

REGULATION – 2020

9Hrs

9 Hrs



Subject Cod MET20OE0	e: 5	: Subject Name COMPOSITE Ty/Lb/ MATERIALS ETL L T P										С		
		Pr	erequis	site: Ni	1					ΤY	3	0	0	3
L : Lecture T	: Tuto	orial	P : P1	roject]	R : Re	esearch	C: Cre	dits T	/L: T	Theory/La	ab	1	•	
Objectives T	`o und	lersta	and nat	ture of	the co	omposit	e mate	rial an	d ap	ply them	where	ever r	equired	1
COURSE O	UTCO	OME	S (CO	s): At	the e	end of t	his cou	ırse tl	ne st	udents v	vould	be ab	le to	
CO1	Unde	Understand the nature ,types and th applications of composite materials												
CO2	Unde	Understand the synthesis of different types of metal matrix materials												
СОЗ	Unde mate	Understand the polymeric composite materials and the characteristic feature of composite materials												
Mapping of	Cours	ourse Outcomes with Program Outcomes (POs)												
COs/POs	P	01	PO2	e PO)3	PO4	PO5	S PO) 6	PO7	РО	8	PO9	PO10
CO1		3	3	3	3	3	2		1	1	1		2	2
CO2		3	3	3	3	3	2		1	1	1		2	2
CO3		3	3	3	3	3	2		1	1	1		2	2
COs / PSOs	5				PSO	1						PSO	2	
CO1					2							2		
CO2					2							2		
CO3					2							2		
H/M/L indic	ates S	tren	gth of	Correl	ation	H- H	ligh, N	I- Me	diun	ı, L-Low	7			
Category		Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course			



Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20OE05	Composite Materials	TY	3	0	0	3

UNIT-I: Introduction:

Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II: Reinforcements:

Preparation-lavup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT - III: Manufacturing of Metal Matrix Composites:

Casting - Solid State diffusion technique, Cladding - Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration -Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT-IV: Manufacturing of Polymer Matrix Composites:

Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method - Filament winding method - Compression moulding - Reaction injection moulding. Properties and applications.

UNIT – V: Strength:

Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

Total No. of Hours: 45 Hrs

Text Books:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.

2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References :

1. Hand Book of Composite Materials-ed-Lubin.

- 2. Composite Materials K.K.Chawla.
- 3. Composite Materials Science and Applications Deborah D.L. Chung.

4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

9 Hrs

9 Hrs

9 Hrs

9 Hrs

9 Hrs

M.TECH – COMPUTER SCIENCE AND ENGINEERING **REGULATION – 2020**



Subject Coo	le:		,	Sul VASTI	oject E TO	Name ENE	e RGY	,	Ty/Lb/ ETL	L	Т	Р	С	
MET20OE	06			Prer	equis	ite: N	il		Ту	3	0	0	3	
L : Lecture	Г : Тι	utorial	P:I	Project	R : R	esear	ch C:	Credits 7	Г/L: Theo	ry/Lab		•	•	
Objectives	Го u	nderst	and th	ie conce	ept of	produ	icing	energy fi	rom the w	aste ma	terial			
COURSE C)UT(COMI	ES (CO	Os): A	t the	end o	f this	s course	the stude	nts wou	ld be	able	to	
CO1	Uno	dersta	nd the	differer	nt type	e of w	aste	which ca	n be conve	erted to	fuel			
CO2	Uno	dersta	nd the	concept	ts and	meth	ods	of bioma	iss pyroly	sis, gasi	ficatio	on ar	nd	
CO3	Und	dersta	nd the	product	tion a	nd cha	aracte	erization	of biogas	technolo	ogy			
Mapping of	g of Course Outcomes with Program Outcomes (POs)													
COs/POs		PO1	PO2	PO3	PO	4 P	05	PO6	PO7	PO8	Р	09	PO10	
CO1		3	3	3	3	,	2	1	1	1		2	2	
CO2		3	3	3	3		2	1	1	1		2	2	
CO3		3	3	3	3	,	2	1	1	1		2	2	
COs / PSOs	;			P	SO1					P	SO2			
CO1					3						3			
CO2					3						3			
CO3					3						3			
							1							
Category	-	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives		Practical / Project Internships / Technical Skill Soft Skills Audit course					



Subject Code	Subject Name	Ty/Lb/ETL	L	Т	Р	С
MET20OE06	Waste to Energy	Ту	3	0	0	3

Unit-I: Introduction to Energy from Waste:

Classification of waste as fuel - Agro based, Forest residue, Industrial waste - MSW -Conversion devices – Incinerators, gasifiers, digestors

Unit-II: Biomass Pyrolysis:

Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods – Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III: Biomass Gasification:

Gasifiers - Fixed bed system - Downdraft and updraft gasifiers -

Fluidized bed gasifiers - Design construction and operation - Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-IV: Biomass Combustion:

Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-V: Biogas:

Properties of biogas (Calorific value and composition) - Biogas plant technology and status -Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion anaerobic digestion - Types of biogas Plants - Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References Books:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 2018

- 2. Biogas Technology A Practical Hand Book Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 2017
- 3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 2017
- 4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 2018.

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Total No. of Hours: 45 Hrs