Walchand College of Engineering

(Government Aided Autonomous Institute) Vishrambag, Sangli-416415



Syllabus F. Y. M. Tech.

(Computer Science and Information Technology)

With effect from

Academic Year 2023-24 (FY M.Tech)

Mrs.13,5, Shutty

HOD(IT)

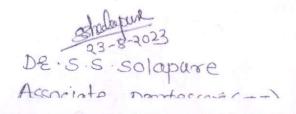
Dept. of Information Technology Walchand College of Engineering, Sangli.

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				2023-24	nute)		
				Information	·		
Prog	ram		M. Tech, All Br				
and the second second	, Sem	ester	First Year M. To				
Cour	se Co	de	7IC501			110	Clicke House
Cour	se Na	me	Research Metho	odology and IPR			
	Teac	hing Scheme		Evamination	Scheme (Marks)		
Lectu		3 Hrs/week	MSE	ISE	ESE ESE		Total
Tutor		******	30	20	50		100
					edits: 3		100
	To	nranara studente for	Course	e Objectives	C	1 1	
1	the	prepare students for hypothesis, design a	undergoing resea research layout se	et a research proce	formulate the resear	ch prob	lems, stat
_	То	enable student inter	pret the results r	propose theories	suggest possible/alt	ernative	colution
2	solv	e, and prove the solu	tion adapted-logi	cally and analytica	ally, conclude the re-	search fi	ndings
3	То	impart knowledge t	o analyze critical	lly the literature	and publish research	ch in co	onference.
3	jour	nals and to expose st	udents to research	ethics, IPR and P	atents		
			utcomes (CO) v		xonomy Level		
At the	e end	of the course, the s	tudents will be a	ble to,			et
CO1	Der	nonstrate a researc	ch solution in res	pective engineer	ing domain using	Apply	
		ropriate Engineerin					
CO2	Dev	ice feasible solution	n to a research pr	roblem in respec	tive engineering	Analy	ze
	don	nain based on econo	mic, social and le	gal aspects using a	appropriate		
		arch procedures and					
CO3	Wri	te research publicati	on, Dissertation, I	PR and patent doc	ument.	Create	
Modu	ile		Modul	e Contents			Пошия
		Engineering Research		e Contents			Hours
I	Engineering Research Process Meaning of research problem, Sources of research problem, Criteria and Characteristics of a good research problem, Errors in selecting a research problem, Definition, scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.					6	
II	Research Methodology Problem statement formulation, resources identification for solution, Experimental						6
Ш	I U N P	Research Methods Jni and Multivaria Method, Regression A Processing and Anal Presentation and Inte	Analysis. Software ysis of Data: Pr	tools like spreads ocessing Operation	sheets. ons, Types of Ana	lysis-	7

De. S.S. Solapure

Dr. R.S. Desai 23/8/2023 23/8/2023 De

	Interpretation. Analyse your results and draw conclusions.	
	Research Practices	
IV	Effective literature studies approaches, critical analysis, Plagiarism, Research ethics, Mendeley - Reference Management Software. Research communication- Effective Technical Writing, Writing a research article for Journal/conference paper, Technical report, Dissertation/ Thesis report writing, Software used for report writing such as WORD, Latex etc. Presentation techniques for paper/report/seminar. Publishing article in Scopus/SCI/Web of science indexed journal or conference.	7
V	Intellectual Property Rights (IPR) Nature of Intellectual Property: Patents, Designs, Trade and Copyright, Ownership of copyright, Term of copyright, Technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. New developments in IPR, Traditional knowledge, Various Case Studies.	7
VI	Patents Patent Rights: Scope of Patent Rights. Various Patent databases. Geographical Indications. Procedure for grants of patents, Patenting under PCT. Licensing and transfer of technology. Administration of Patent System. Introduction to International Scenario: WIPO, TRIPs, Patenting under PCT	6
	Tardhasha	
1	Textbooks Kothari C. P. "Passarah Mathadalam" 2nd Edition New Analytical State of the Control o	2004
1 2	Kothari C. R, "Research Methodology", 2nd Edition, New Age International, Melville Stuart and Goddard Wayne, "Research Methodology: An Introduction for	2004 Science &
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7	Writing
10	https://nptel.ac.in/courses/121/106/121106007/
11	https://www.wipo.int/about-wipo/en/

			CO-PO M	lapping				
	Programme Outcomes (PO)							
	1	2	3	4	5	6		
CO1	3		1					
CO2			2	3	2			
CO3		3		2		2		

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

DE.S.S. Solapune Assoriate Drotessor (IT)

		,		llege of Engineerin				
			(Government 1	AY 2023-24				
			Cou	rse Information				
Progra	amme		M.Tech. (CS	and IT)				
Class,		ter	FirstYear M. Tech., Sem I					
Course Code			7IC501	· · · · · · · · · · · · · · · · · · ·				
Course	e Nam	e	Research Methodology and IPR					
Desire	d Requ	uisites:	Mathematics ba					
			I					
Tea	aching	Scheme		Examination	Scheme (Marks)			
Lectur		3 Hrs/Week	MSE	ISE	ESE	Total		
Tutori	ial	-	30	20	50	100		
Practio	cal	-			I.			
Intera	ction			Cr	edits: 3			
			1					
			Co	urse Objectives				
1	To id	lentify the rese		with scientific meth	nods			
2				nd hypothesis for d				
3				for data and result				
				O) with Bloom's T				
At the	end of		e students will	<u> </u>				
CO1			rea for dissertation	<u> </u>		Apply		
CO2			collection meth			Analyze		
CO3		ulate the research				Design		
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3.5.3								
Modu	ıle		Mo	odule Contents		Hours		
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List of Assignment:

- 1. Compare difference between research methodology and research method
- 2. Compare and contrast between basic research and applied research in brief
- 3. Perform the literature survey using following tool: Web of Science, Scopus
- 4. Design a model for an engineering research
- 5. Compare between model and process in engineering research and perform data analysis using modern engineering tools
- 6. Apply the following characteristics of quality research to engineering problem:
 - a) Identifying the problem
 - b) Reviewing literature
 - c) Setting objectives and hypothesis
 - d) Choosing the study of design
 - e) Deciding on the sample design
 - f) Collecting data
 - g) Processing and analyzing data
 - h) Writing the report
 - i) Disseminating the findings

	1) Disseminating the findings
	Text Books
1	Kothari C. R, "Research Methodology", 2nd Edition, New Age International, 1990
2	Chopra Deepak and Sondhi Neena, "Research Methodology: Concepts and cases", 2nd Edition, Vikas Publishing House, New Delhi, 2015
	References
1	Melville Stuart and Goddard Wayne, "Research Methodology: An Introduction For Science & Engineering Students", 1st Edition, Kenwyn Juta & Co. Ltd.,1996
2	G. Ramamurthy, "Research Methodology", 2nd Edition, Dream Tech Press, New Delhi, 2015
	Useful Links
1	https://onlinecourses.swayam2.ac.in/ntr21_ed23/preview - Academic Research & Report Writing
2	https://www.scopus.com/search/form.uri?display=basic#basic
3	https://onlinecourses.nptel.ac.in/noc21_ge12/preview - Qualitative Research Methods And Research Writing
4	https://onlinecourses.nptel.ac.in/noc21_hs44/preview - Effective Writing
5	https://webofscienceacademy.clarivate.com/learn
6	https://onlinecourses.swayam2.ac.in/ntr21_ed23/preview - Academic Research & Report Writing
7	https://nptel.ac.in/courses/121/106/121106007/

CO-PO Mapping									
	Programme Outcomes (PO)								
	PO1	PO2	PO3	PO4	PO5	PO6			
CO1	2		1						
CO2				2		1			
CO3		3							

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

				lege of Engineering,				
			,	Aided Autonomous Ins	titute)			
				AY 2023-24				
				rse Information				
Prograi			M.Tech. (CS and IT) First Year M. Tech. Sem I					
	Semester		First Year M. Tech., Sem I 7IT501					
Course				1				
Course			Advanced Algorit					
Desired	Requisites:		Computer Algorit	nms				
То	achina Caha			Evamination C	Sahama (Maulza)			
Lecture	aching Sche	s/week	MCE		Scheme (Marks) ESE	Total		
		S/ WCCK	MSE	ISE				
Tutoria			30	20	50	100		
Practica				C	1:4 2			
Interac	tion	-		Cred	lits: 3			
			Co	urse Objectives				
1	To exercise	the Grap	h Algorithms	.				
2			oath computing tech	nniques				
3				formance and comple	exities			
'		Cou	irse Outcomes (Co	O) with Bloom's Tax	conomy Level			
At the e	nd of the cou	irse, the s	tudents will be able	e to,				
CO1	Solve graph	related a	lgorithms with real	world problems		Apply		
CO2	Calculate th	ne shortes	t path for a given d	istance based scenario)	Analyze		
CO3	Verify the s	solution fo	or engineering prob	lem using graph algor	rithm	Create		
Modul				dule Contents		Hours		
-	I	•	ph Algorithms an	_				
Ι			al Sort, Strongly Co Algorithms of Krusl	nnected Components kal and Prim	Growing a Minimum	7		
II	Directe	d Acyclic		rithms: Bellman-Ford Algorithm, Difference on the Properties		6		
III Warshall Algorith			imum Flow: Shortest Paths and Matrix Multiplication, Floydhm, Johnson's Algorithm for Sparse Graphs Flow Networks, Method, Maximum Bipartite Matching, Push-relable algorithms					
IV	IV Multithreaded Algorithms and Matrix Operations: Dynamic Multithreading fundamentals, Multithreaded Matrix Multiplication, Multithreaded merge sort Solving systems of linear equations, Inverting matrices, Symmetric positive-definite matrices and least-squares approximation				6			
V		mpletene ility, NP o		ime verification, s, NP-complete proble	NP-completeness and ems	7		
VI	problen		-covering problem,		The traveling-salesman inear programming, The	6		

				Text Books					
1	Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Third Edition the MIT Press Cambridge, London, England								
				References					
1		tz, Sahni Rajase Press, New yo		uter Algorithms	", Computer Sci	ience, W. H. Fre	eeman and		
				Useful Links					
1	To be de	clared during th	e course on the	e CMS.					
2									
	·		CO	D-PO Mappin	g				
			Progran	nme Outcome	s (PO)				
		PO1	PO2	PO3	PO4	PO5	PO6		
C	CO1	2							
C	CO2		3		2	1			
	CO3 3 2 1								

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

			Walchand Cal	llege of Engineerin	a Sanali					
Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)										
			·	AY 2023-24	·					
				rse Information						
Progra			M.Tech. (CS an							
Class, Semester First Year M. Tech., Sem I										
Course Code 7IT502										
Course Name Unix Internal										
Desire	d Req	uisites:	Operating Syste	em						
Tr.	1.	C I	I	TO	C.I. (M. I.)					
Lectur		g Scheme 3 Hrs/week	MOD		Scheme (Marks) ESE	Tota	.1			
Tutori		3 ms/week	MSE	ISE	50	100				
Praction		-	30	20	50	100)			
Interac		_		Cre	edits: 3					
mera	Ction									
	T			urse Objectives						
1				nilosophy of the U	nix/Linux OS.					
2			rchitecture of Uni	ıx/Lınux OS.						
3	To u		of Linux/Unix.	O) '/I DI 1 T	Υ 1					
A t tha	and of		e students will be a	O) with Bloom's T	axonomy Level					
CO1				ohy of the Unix/Linu	νν OS	Δn	ply			
CO2			cture of Unix/Linux		17 03		lyze			
CO3							<u> </u>			
			CO3 Compare various IPCs Linux OS Analyze							
Modu										
MIOUU	le		N	Iodule Contents			Hours			
	Ir		Unix Internals							
I	In G	eneral Overvie	Unix Internals w of the System -	History, System Str	ucture, User Perspecti	ve,	Hours 7			
	In G O	eneral Overvie perating System	Unix Internals w of the System - m Services, Assum			ve,				
I	In G O In	eneral Overvie perating System atroduction to	Unix Internals w of the System - m Services, Assum the Kernel	History, System Str aption About Hardw	are.		7			
	In G O In A	eneral Overvie perating System troduction to rchitecture of U	Unix Internals w of the System - m Services, Assum the Kernel UNIX OS, Introduc	History, System Straption About Hardw	are. cepts, Kernel Data Str	ucture,				
I	In GO In A St	eneral Overvie perating System troduction to rchitecture of Uystem Adminis	Unix Internals w of the System - m Services, Assum the Kernel UNIX OS, Introduc	History, System Str aption About Hardw ction to system conc re of UNIX OS, Intr	are.	ucture,	7			
I	In G O In A St	eneral Overvie perating System troduction to rchitecture of Uystem Adminis ernel Data Stru	Unix Internals w of the System - m Services, Assum the Kernel UNIX OS, Introduc stration Architectur	History, System Str aption About Hardw ction to system conc re of UNIX OS, Intr	are. cepts, Kernel Data Str	ucture,	7			
П	In GOOM	peneral Overvie perating System troduction to rchitecture of U ystem Administernel Data Stru- nternal Representation	Unix Internals w of the System - m Services, Assum the Kernel UNIX OS, Introductivation Architectur acture, System Adr sentation of Files of the regular file,	History, System Straption About Hardwestion to system concrete of UNIX OS, Intransistration	epts, Kernel Data Strooduction to system co	ucture, ncepts, inode,	7			
I	In GOOM	eneral Overvie perating System troduction to rchitecture of U ystem Administernel Data Stru- nternal Representations, structure uper block, inoce	Unix Internals w of the System - m Services, Assum the Kernel UNIX OS, Introductivation Architectur acture, System Adr sentation of Files of the regular file,	History, System Straption About Hardward Cition to system concretof UNIX OS, Intransistration	epts, Kernel Data Strooduction to system co	ucture, ncepts, inode,	7 6			
П	In GOOM	perating System troduction to rehitecture of Uystem Administernel Data Struternal Represendes, structured uper block, inougher.	Unix Internals ow of the System - m Services, Assum the Kernel UNIX OS, Introduct stration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a	History, System Straption About Hardward Cition to system concretof UNIX OS, Intransistration	epts, Kernel Data Strooduction to system co	ucture, ncepts, inode,	7 6			
I	In GOO In A Sy K	peneral Overvie perating System troduction to rchitecture of U ystem Administernel Data Stru- ternal Represendes, structure uper block, inocupes. tructure of Preservices	Unix Internals w of the System - m Services, Assum the Kernel UNIX OS, Introduction Architectur acture, System Adr sentation of Files of the regular file, de assignment to a	History, System Straption About Hardwestion to system concrete of UNIX OS, Introduction directories, convertine file, allocation	septs, Kernel Data Strooduction to system co	inode,	7 6 7			
П	In GOOD In A Sy K	peneral Overvie perating System troduction to rchitecture of U ystem Administernel Data Stru- nternal Represences, structure aper block, inocupes. tructure of Process stages and	Unix Internals w of the System - m Services, Assum the Kernel UNIX OS, Introductive Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess nd transitions, layo	History, System Straption About Hardwestion to system concrete of UNIX OS, Introduction directories, convertine file, allocation	epts, Kernel Data Stroduction to system co sion of a pathname to of disk blocks, other	inode,	7 6			
I	In GOO In A SE K	peneral Overvie perating System troduction to rchitecture of U ystem Administernel Data Stru- nternal Represences, structure aper block, inocupes. tructure of Process stages and	Unix Internals ow of the System - m Services, Assum the Kernel UNIX OS, Introductration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess nd transitions, layo f a process, manipu	History, System Straption About Hardwestion to system concre of UNIX OS, Intransistration, directories, convernew file, allocation out of system memoral	epts, Kernel Data Stroduction to system co sion of a pathname to of disk blocks, other	inode,	7 6 7			
I III IV	In GOOD In A Signature of the Signature	perating System Administrate Ad	Unix Internals aw of the System - m Services, Assum the Kernel UNIX OS, Introduce tration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess and transitions, layo f a process, manipu l , signals, process to	History, System Straption About Hardward About Hardward Control of the of UNIX OS, Introduction of the control of the process	sare. septs, Kernel Data Structure of the system content of a pathname to of disk blocks, other system context of a Press address space.	inode, file	7 6 7			
I	In GOO In A Sook K	peneral Overvier perating System Atroduction to architecture of Uystem Administernel Data Structure aper block, inocupes. Tructure of Process stages are aving context or rocess Controducting other process of the pro	Unix Internals w of the System - m Services, Assum the Kernel UNIX OS, Introductive acture, System Adresentation of Files of the regular file, de assignment to a ocess and transitions, layor f a process, maniput l , signals, process to	History, System Straption About Hardwestion to system concrete of UNIX OS, Intransistration, directories, convernew file, allocation out of system memoral action of the process ermination, awaiting ad of a process, the straps.	epts, Kernel Data Stroduction to system coduction to system coduction of a pathname to of disk blocks, other system coduction to system and the system Boot and system Boot and	inode, file	7 6 7			
I III IV	In GOO In A Signature of the state of the st	perating System troduction to architecture of laystem Administernel Data Structure of Data Structure of Process stages are aving context of rocess creation tooking other process, Process	Unix Internals ow of the System - m Services, Assum the Kernel UNIX OS, Introduct stration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess nd transitions, layo f a process, manipu l , signals, process to orograms, the user i Scheduling, system	History, System Straption About Hardward About Hardward Control of the of UNIX OS, Introduction of the control of the process	epts, Kernel Data Stroduction to system coduction to system coduction of a pathname to of disk blocks, other system coduction to system and the system Boot and system Boot and	inode, file	7 6 7			
I III IV V	In GOO In A Sign K	perating System Administrate Ad	Unix Internals ow of the System - m Services, Assum the Kernel UNIX OS, Introduce stration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess and transitions, layo f a process, manipu l , signals, process te programs, the user if Scheduling, system communication	History, System Struction About Hardwestion to system concee of UNIX OS, Introduction directories, convernew file, allocation out of system memoral action of the process ermination, awaiting dof a process, the semical for time, clock	septs, Kernel Data Structure oduction to system consistency of a pathname to of disk blocks, other stry, the context of a Press address space. It is process termination, shell, system Boot and k.	inode, file occess,	7 6 7			
I III IV	In GOO In A Sign K	perating System Administraternal Representation of Land Structure of Land Structure of Process stages and avoing context of rocess Control rocess Control rocess, Process of IPCs, I	Unix Internals aw of the System - m Services, Assum the Kernel UNIX OS, Introduce tration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess and transitions, layou f a process, manipul , signals, process to orograms, the user i Scheduling, system communication importance of IPC a	History, System Straption About Hardward About Hardward Control of the of UNIX OS, Introduction of the control of the process	septs, Kernel Data Stranduction to system consistency of a pathname to of disk blocks, other strands address space. The space of the system Boot and space of th	inode, file occess,	7 6 7 7			
I III IV V	In GOO In A Solid In In State of the State o	perating System Administernel Data Structure of Process Stages and avoiding context of rocess Control rocess, Process Cypes of IPCs, I Iemory, Massa	Unix Internals aw of the System - m Services, Assum the Kernel UNIX OS, Introduce tration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess and transitions, layo f a process, manipul l , signals, process to arograms, the user i Scheduling, system communication mportance of IPC a ge Queue, Semaph	History, System Straption About Hardward About Hardward Control of the of UNIX OS, Introduction of the control of the process	septs, Kernel Data Structure oduction to system consistency of a pathname to of disk blocks, other stry, the context of a Press address space. It is process termination, shell, system Boot and k.	inode, file occess,	7 6 7			
I III IV V	In GOO In A Solid In In State of the State o	perating System Administraternal Representation of Land Structure of Land Structure of Process stages and avoing context of rocess Control rocess Control rocess, Process of IPCs, I	Unix Internals aw of the System - m Services, Assum the Kernel UNIX OS, Introduce tration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess and transitions, layo f a process, manipul l , signals, process to arograms, the user i Scheduling, system communication mportance of IPC a ge Queue, Semaph	History, System Straption About Hardward About Hardward Control of the of UNIX OS, Introduction of the control of the process	septs, Kernel Data Stranduction to system consistency of a pathname to of disk blocks, other strands address space. The space of the system Boot and space of th	inode, file occess,	7 6 7 7			
I III IV V	In GOO In A Sign K In In State of the Sign For In	perating System Administration of Land Represented Block, inotation of the process stages and avoing context of the process creation avoking other process, Process of IPCs, I Jemory, Massa omparison of volume process of the process	Unix Internals aw of the System - m Services, Assum the Kernel UNIX OS, Introduce tration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess and transitions, layo f a process, manipul , signals, process to orograms, the user i Scheduling, system communication mportance of IPC a ge Queue, Semaph various IPCs	History, System Straption About Hardward About Hardward Control of the of UNIX OS, Introduction of the control of the process	septs, Kernel Data Strooduction to system consistency of a pathname to of disk blocks, other strongs, the context of a Press address space. It is process termination, shell, system Boot and k. It is system Boot and k. It is system Boot and k. It is system Boot and k.	inode, file occess,	7 6 7 7			
I III IV V	In GOO In A Signature of the second of the s	perating System Administrated Data Structure of Process Stages and Process Control Process Con	Unix Internals aw of the System - m Services, Assum the Kernel UNIX OS, Introduce tration Architectur acture, System Adr sentation of Files of the regular file, de assignment to a ocess and transitions, layou f a process, manipul , signals, process to orograms, the user i Scheduling, system communication importance of IPC a ge Queue, Semaph various IPCs	History, System Straption About Hardward About Hardward Country of the of UNIX OS, Introduced the of UNIX OS, Introduced the of UNIX OS, Introduced the order of UNIX OS, Introduced the OS, Int	septs, Kernel Data Strooduction to system consistency of a pathname to of disk blocks, other strongs, the context of a Press address space. It is process termination, shell, system Boot and k. It is system Boot and k. It is system Boot and k. It is system Boot and k.	inode, file occess,	7 6 7 7			

Refere	ences
1	Beej Jorgensen, "Beej's Guide to Unix IPC", Brian -Beej Jorgensen Hall, Version 1.1.2, December, 2010
2	Kay Robbins, Steve Robbins, "UNIX Systems Programming: Communication, Concurrency and Threads", Pearson, 2nd Edition, December, 2015
3	Eric Raymond, "Art of UNIX Programming", Pearson, 1st edition, October, 2003
	Useful Links
1	https://nptel.ac.in/courses/106/102/106102132/ (Intro to Unix System Calls Part 1/2, Kernel Data Structures, Process structure, Context Switching, Fork, Context-Switch, Process Control Block, Locking, File System Implementation, File System Operation)
2	https://onlinecourses.nptel.ac.in/noc19_cs50 (Processes, Scheduling in Linux, IPC, thread)
3	https://github.com/suvratapte/Maurice-Bach-Notes
4	https://github.com/mit-pdos/xv6-public
5	https://www.geeksforgeeks.org/introduction-to-unix-system/
6	http://www.di.uevora.pt/~lmr/syscalls.html

CO-PO Mapping										
	Programme Outcomes (PO)									
	PO1	PO2	PO3	PO4	PO5	PO6				
CO1	2	2								
CO2			1							
CO3	3			2						

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

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			Walchand Calla	ge of Engineering	Sangli		
				ge of Engineering ded Autonomous Ir			
			,	Y 2023-24	isitiuic)		
				se Information			
Progr	amme		M.Tech. (CS ar	nd IT)			
	Semes	ster	First Year M. T				
	e Code		7IT503	,			
Cours	Course Name Database Design and Performance Tuning (Theory)						
Desire	ed Req	uisites:	Database		<i>U</i>	, ,	
			I				
To	eachin	g Scheme			ion Scheme arks)		
Lectu	re	3 Hrs/week	MSE	ISE	ESE	To	tal
Tutor		-	30	20	50	1	00
Practi		-					
Intera	ction	-		Cree	dits: 3		
			Cour	rse Objectives			
1		aring to interpifications.	oret database desi	gn, constructing	and tuning accord	ling to th	e
2	To in	npart databas	e security and ad	ministrative and	performance mon	itoring T	asks.
3	To a	pprise about t	he requirements,	data structures, r	etrieval technique	es of con	nplex
	datal	oase systems.					
				CO) with Bloom's Level	Taxonomy		
			students will be a	<u> </u>			
CO1	Comp	rehend the dat	abase design cycle	and administration	1	Underst	anding
CO2		ating database lines and KPI's		uning on the basis	of	Ana	lyze
CO3				alyzing parallel an	d	Crea	ite
	distril	outed transaction	ons				
Modu	ulo			Module			Hours
wiout	iie			Contents			HOURS
	(Concepts of Da	tabase Design and				
I	l I	ntroduction, S	oftware Developr	ment cycle (SDLe	C), Database Dev		7
	•		_		zation concepts		
					ization's DBMS	Strategy,	
				rformance manage	ment		
			ng and Optimization		ry decomposition	anery	
II	II Introduction, Query processing, syntax analyzer, query decomposition, query optimization (cost estimation), pipelining and materialization, Heuristics					6	
				ery evaluation plan			
	F	arallel and dist	ributed transaction	n processing			
III					Distributed tran	nsactions,	7
1111	Op	timization of	Distributed Q	ueries, Multi-dat		rocessing,	/
			rrency control and	recovery			
_		Database securi	•				_
IV					l in database syster		7
	- 1			ultilevel database	security, statistical	database	

recovery, Intrusion tolerant database systems, SQL injection

V	Physical Database Design and Tuning Physical DB Design, Index selection, Guidelines for Index Selection, Clustering and Indexing, Overview of Database Tuning, Choices in Tuning the Conceptual Schema, Choices in Tuning Queries, DBMS Benchmarks	
VI	Complex database systems Introduction to Spatial Databases: Spatial Data Structures, Spatial Storage and Indexing, spatial queries, Multimedia databases, Temporal and sequential databases	

Text Books

- S.K.Singh, "Database systems: Concepts, Design and Application", 2nd Edition, Pearson Education, 2011
- 2 Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", Second Edition, Tata McGraw Hill Inc, 2008.

References

- IBM DB2 Universal Database- Administration Guide: Performance, V. 8, 2002.
- 2 Craig S. Mullins, Database Administration: The Complete Guide to Practices and Procedures, Addison-Wesley Professional, 2002.
- Dennis Shasha and Philippe Bonnet, Database Tuning, Principles, Experiments and Troubleshooting Techniques, Elsevier Reprint 2005.

Useful Links

1

CO-PO Mapping						
Programme Outcomes (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3				
CO2	3	1	2			
CO3	3	2	1	2		

Assessment

The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3 ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

	Walchand College of Engineering, Sangli			
	(Government Aided Autonomous Institute)			
	AY 2023-24			
	Course Information			
Programme	M.Tech. (CS and IT)			
Class, Semester	First Year M. Tech., Sem I			
Course Code	7IT551			
Course Name	Advanced Algorithms Lab			
Desired Requisites:	Data Structures, Computer Algorithms			

Teaching Scheme		Examination Scheme (Marks)					
Lecture	-	LA1	LA1 LA2 Lab ESE Total				
Tutorial	-	30	30	40	100		
Practical	2 Hrs/Week						
Interaction	-	Credits: 1					

	Course Objectives				
1	To demonstrate the concepts of Graph Algorithms.				
2	2 To implement shortest path computing techniques.				
3	To compare the algorithms based on complexities.				
	Course Outcomes (CO) with Bloom's Taxonomy Level				
At the	At the end of the course, the students will be able to,				
CO1	Demonstrate graph related algorithms with real world problems	Apply			
CO2	Implement the shortest path for a given distance based scenario	Apply			
CO3	Design approximation algorithms in graph	Create			

List of Experiments / Lab Activities

List of Experiments:

Activities are to be carried out individually.

Each student will perform the activity based on course on following areas.

- 1. Implement the Elementary Graph Algorithms and MST
- 2. Demonstrate the Single Source Shortest Path Algorithms
- 3. Implement the Multithreaded Algorithms and Matrix Operations
- 4. Study NP-Completeness and Polynomial-time verification
- 5. Demonstrate the Approximation Algorithms in graph theory

Student should perform the activities on the basis of the real-time applications in the subjects and submit the work with code, PPT, PDF, Text report document & reference material or on online GitHub. Students should maintain activity log book containing weekly progress

	Text Books					
1	Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Third Edition the MIT Press Cambridge, London, England.					
	References					
1	Horrowitz, Sahni Rajasekaran, "Computer Algorithms", Computer Science, W. H. Freeman and company Press, New york					
	Useful Links					
1	https://nptel.ac.in/courses/106/101/106101060/					
	'					

	CO-PO Mapping						
		Program	me Outcomes	(PO)			
	PO1	PO2	PO3	PO4	PO5	PO6	
CO1	3		1				
CO2		2					
CO3			3		1		

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	30
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	30
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	30
Lab ESE	Lab activities,	Lab Course	During Week 13	40
Lao ese	attendance, journal	Faculty	Marks Submission at the end of Week 13	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli			
	(Government Aided Autonomous Institute)		
	AY 2023-24		
Course Information			
Programme	M.Tech. (CS and IT)		
Class, Semester	First Year M. Tech., Sem-1		
Course Code	7IT552		
Course Name	Unix Internal lab		
Desired Requisites:	Operating System, (C/python) Programming language		

Teaching Scheme		Examination Scheme (Marks)					
Lecture	-	LA1	LA1 LA2 Lab ESE Total (POE)				
Tutorial	-	30	30	40	100		
Practical	2 Hrs/Week						
Interaction	-	Credits: 1					

	Course Objectives				
1	To use various system call of Unix/Linux				
2	To elaborate the various inter process communications				
3	3 To impart the inter process communications for solving the real world problems				
	Course Outcomes (CO) with Bloom's Taxonomy Level				
At the	end of the course, the students will be able to,				
CO1	Illustrate the difference between thread and process	Apply			
CO2	Identify different system calls for Linux/Unix programming	Analyze			
CO3	Implement various inter process communications available in operating	Apply			
003	system				

List of Experiments / Lab Activities

List of Experiments:

List of Experiments:

- 1. Processing Environment: fork, vfork, wait, waitpid, exec (all variations exec), and exit
- 2. IPC: Interrupts and Signals: signal(any three type of signal), alarm, kill, signal
- 3. File system Internals: Stat, fstat, ustat/lock/flock.
- 4. Threading concept: In c language (P thread) clone, threads of java
- 5. IPC: Semaphore: semaphore. h-semget, semctl, semop
- 6. IPC: Message Queue: msgget, msgsnd, msgrcv
- 7. IPC: Shared memory: shmget, shmat, shmdt
- 8. IPC: Sockets: socket system calls in C/socket programming of Java/python.
- 9. IPC: Pipe/FIFO
- 10. Scripting writing in Linux and python

Student should perform the activities on the basis of the real-time applications in the subjects and submit the work with code, PPT, PDF, Text report document & reference material or on online GitHub. Students should maintain activity log book containing weekly progress

	Text Books						
1	Maurice J. Bach, "The Design of Unix Operating System", PHI, 1994.						
2	Sumitabha Das, "Unix Concepts and Applications", TMGH, 4th Edition, 2017.						
	References						
1	Beej Jorgensen, "Beej's Guide to Unix IPC", Brian -Beej Jorgensen Hall, Version						
1	1.1.2, December, 2010						

2				IX Systems Pro			
	Concurrency and Threads", Pearson, 2nd Edition, December, 2015						
3	Eric Ra	aymond, "Art	of UNIX Prog	gramming", Pea	arson, 1st editi	on, October, 2	003
			1	Useful Links			
1	https://	users.cs.cf.ac.ı	ık/Dave.Mars	hall/C/			
2	https://	github.com/su	vratapte/Mau	rice-Bach-Note	es		
3	https://	github.com/mi	it-pdos/xv6-p	ublic			
4	https://	www.geeksfoi	geeks.org/int	roduction-to-ur	nix-system/		
5.	https://	github.com/be	ejjorgensen/b	gipc			
6.	http://v	www.di.uevora	.pt/~lmr/sysc	alls.html			
			CO	-PO Mapping			
			Program	me Outcomes	(PO)		
		PO1	PO2	PO3	PO4	PO5	PO6
C	CO1	3		3			
C	CO2		2				1
	CO3 1 2						

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	30
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	30
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	30
Lab ESE	Lab activities,	Lab Course	During Week 13	40
Lau ESE	attendance, journal	Faculty	Marks Submission at the end of Week 13	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
	AY 2023-24				
	Course Information				
Programme M.Tech. (CS and IT)					
Class, Semester First Year M. Tech., Sem-1					
Course Code	Course Code 7IT553				
Course Name	Course Name Database Design and Performance Tuning (Lab)				
Desired Requisites:	Desired Requisites: Database Engineering or Database Management System (DBMS)				

Teaching Scheme		Examination Scheme (Marks)				
Lecture	-	LA1	LA2	Lab ESE (POE)	Total	
Tutorial	-	30	30	40	100	
Practical	2 Hrs/Week					
Interaction	-	Credits: 1				

Course Objectives

1	To provide students with an understanding of the practices of database design, query					
	processing, transaction processing.					
2	To provide students with hands- on database recovery and security.					
3	To provide students with hands- on database tuning to improve DBMS performance.	rmance.				
	Course Outcomes (CO) with Bloom's Taxonomy Level					
At the	end of the course, the students will be able to,					
CO1	Demonstrating the database design cycle and administration.	Apply				
CO2	Evaluating database performance and tuning on the basis of guidelines and	Analyze				
	KPI's					
CO2	Devising optimized query plans and analyzing parallel and	Create				
CO3	distributed transactions					

List of Experiments / Lab Activities

List of Experiments:

- 1. Database Design and administration DBMS software's (e.g. DB2,Oracle)
- 2. Query Processing and Optimization 10
- 3. Study of performance tuning parameters.
- 4. Study of providing security to DBMS. 8
- 5. Study of recovery of DBMS.
- 6. Study of Transaction Processing in DBMS.

Text Books					
1	IBM DB2 Universal Database- Administration Guide: Performance, Vol. 8, 2002.				
2	Oracle 10g Administration study Guide, Sybex Publisher, 2005				
	References				
1	IBM DB2 Universal Database- Administration Guide: Performance, V. 8, 2002.				
2	Craig S. Mullins, Database Administration: The Complete Guide to Practices and Procedures, Addison-Wesley Professional, 2002.				
3	Dennis Shasha and Philippe Bonnet, Database Tuning, Principles, Experiments and Troubleshooting Techniques, Elsevier Reprint 2005.				

	Useful Links								
1	1								
	CO-PO Mapping								
	Programme Outcomes (PO)								
		PO1	PO2	PO3	PO4	PO5	PO6		
CO	CO1 1 3 3								
CO	CO2 3 2 1								
C	03	1	2		2				

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	30
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	30
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	30
Lab ESE	Lab activities,	Lab Course	During Week 13	40
Lauese	attendance, journal	Faculty	Marks Submission at the end of Week 13	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

			Walchand Coll	age of Engineering	Sangli			
	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)							
			,	AY 2023-24	,			
				rse Information				
Progra	amme		M.Tech. (CS and					
Class,			First Year M. Tec	h., Sem I				
Course			7IT511					
Course			I.	ive - 1: Cloud and Vi	rtualization Techniqu	ies		
Desire	d Req	uisites:	Computer Networ	·ks				
Te	achin	g Scheme		Examination Sc	heme (Marks)			
Lectur	·e	3 Hrs/week	MSE	ISE	ESE]	Γotal	
Tutori		-	30	20	50		100	
Praction		-						
Intera	ction	-		Credi	ts: 3			
1	Total	lahamata firm J		irse Objectives				
1 2			nentals of virtualizat		nα			
3				odel in cloud computing the control of the control	ug			
3	1011			D) with Bloom's Tax	onomy Loyal			
At the	and of		students will be ab		onomy Level			
CO1			of cloud computing	10,		App	1 _v	
CO2				lov the services on clo	and infrastructure			
CO3								
000	1 11141	y ze ser vice ino	delis for data center	арричатона		7 1110	1,20	
Modu	le		Mod	lule Contents			Hours	
Ι	S	irtualization an AAS, Cloud De		g, Cloud Reference M Public Cloud, Private (7	
II	V	Tirtualization Iosted and Bare	<u>, </u>	ualization, Desktop V Virtualization	irtualization,		6	
III	N P It	letwork Functi ublic Cloud Ne nfrastructure, V	ions tworking: Route53,	Content Delivery Ne ctions: Cloud Firewal			6	
IV	V	Tirtual Private PC fundamenta	Clouds (VPC)	ate Subnets, Security	Groups, Network		7	
V	Cloud Management					7		
VI	C	pen Source and	oud Computing I Commercial Cloud g, Fog Computing	ds, Cloud Simulator, I	Research trend in		6	
				Text Books				
1	Grav	Weight Hill Education	hristian Vecchiola, n, 3rd Edition, 2011	S. Thamarai Selvi, "M				
2	Thomas Frl. Zaigham Mahmood and Ricardo Puttini, "Cloud Computing: Concents, Technology							

	References						
1	Richardo Puttini, Thomas Erl, and Zaigham Mahmood, "Cloud Computing: Concepts, Technology & Architecture", Pearson Prentice Hall, 2nd edition, 2013						
2	Srinivasan, J. Suresh, "Cloud Computing: A practical approach for learning and implementation", Pearson, 2nd Edition, 2012						
	Useful Links						
1	Module: I, II, IV, V, VI						
	https://nptel.ac.in/content/syllabus_pdf/106105167.pdf						
2	https://aws.amazon.com/						

CO-PO Mapping							
	Programme Outcomes (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	
CO1	1						
CO2			2		2		
CO3		3		1			

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

				ollege of Engineerin		
			Governmen	t Aided Autonomous AY 2023-24	insiilule)	
			C	ourse Information		
Progra	mme		M.Tech. (CS a			
Class,			First Year M. 7	<u> </u>		
Course			7IT512	icen., sem i		
Course				ective - 1: Ruby & G	o Programming Language	
		uisites:	C & CPP Progr	-	o i rogramming Language	
Desire	u Keq	uisites.	C & CIT I logi	anning		
Те	achin	g Scheme		Examination	Scheme (Marks)	
Lectur		3 Hrs/week	MSE	ISE	ESE	Total
Tutoria		3 THS/ WEEK	30	20	50	100
Practic		-	30	20	50	100
Interac		_		Cr	edits: 3	
micra	CHOII	_		CI	cuits. 3	
				Course Objectives		
1	To 22	se various parac		d Go Programming L	anguage	
2				andling and error har		
3				nguage for process sy		
3	10 00			CO) with Bloom's T		
Δt the i	end of		students will be		axonomy Level	
CO1				ning concepts using R	uhv	Apply
CO2				dling using Ruby and		Apply
CO2				n using Go Language		Analyze
CO3	Anai	yze the syneme	mzation problei	ii usiiig Go Laiiguage	/	Allaryze
Modul	1.					
Miduu	ie		M	Iodule Contents		Hours
I	In B N	rief history of fumbers, Text & (ii)	Ruby Programs Ruby, Installing & Strings, Arrays	ming & running Ruby, C & Hashes, Symbols	ommand Line Arguments, , Expressions (True, False,	
	In B N N C C F C C A M	rief history of fumbers, Text & fil) classes, Modules clow Control & conditionals, Local classes, Modules ttributes, Inheritation, Attributes, Attributes, Attributes	Ruby Programs Ruby, Installing Strings, Arrays S & Objects: Obj Statements and ops, Error & Exc S & Objects: Sin itance, Persistence	wing & running Ruby, C & Hashes, Symbols ects, Classes, Variab Properties ception Handling, The nple Ruby Classes, Cee Setter & Getter metle	, Expressions (True, False, les reads & Fibers	
I	In B N N N C C C C C A M M M S S D	rief history of fumbers, Text & fill) classes, Modules clow Control & conditionals, Lo classes, Modules ctributes, Inheritethods, Attributes Control feta- programmitrings, Variable dynamically add	Ruby Programs Ruby, Installing & Strings, Arrays s & Objects: Obj Statements and ops, Error & Exc s & Objects : Sin itance, Persistence ites & Variables: o, Instance Variab ming & File Hau ing :Exceptions, its, Missing Methol ing methods, Th	wing & running Ruby, C & Hashes, Symbols ects, Classes, Variab d Properties ception Handling, The nple Ruby Classes, Coe Setter & Getter metholes ndling: Types, Modules & ods & Constants, Cus	reads & Fibers bject Instances, nods, Method Visibility Classes, Blocks &	7
I	In B N N C C C C C A M (A M S S D D In Ir ty	rief history of fumbers, Text & fumbers, Text & full) classes, Modules flow Control & fundationals, Lo flasses, Modules flass	Ruby Programs Ruby, Installing & Strings, Arrays S & Objects: Obj Statements and ops, Error & Exc S & Objects: Sin itance, Persistence ites & Variables: Instance Var	wing & running Ruby, C & Hashes, Symbols ects, Classes, Variable Properties ception Handling, The nple Ruby Classes, Coe Setter & Getter metholes ndling: Types, Modules & ods & Constants, Cus reads, I/O Objects, R	reads & Fibers beject Instances, nods, Method Visibility Classes, Blocks & stom Structures, eading file, writing file.	7
I	In B N N N C C C C A M M M S S D In Irr ty	crief history of fumbers, Text & full) classes, Modules flow Control & fonditionals, Lo flasses, Modules fonditionals, Lo flasses, Modules flasses, Modules flasses, Modules flasses, Modules flasses, Modules flasses, Control flata-programmi flata-programmi frings, Variable flata-programmi flata-program	Ruby Programs Ruby, Installing & Strings, Arrays & Objects: Obj Statements and ops, Error & Exc & Objects: Sin itance, Persistence tes & Variables: , Instance Variab ming & File Hai ing: Exceptions, is, Missing Metholing methods, The Go Language ogram Structure: e, number, string operations: composite data is, structs	wing & running Ruby, C & Hashes, Symbols ects, Classes, Variab d Properties ception Handling, The nple Ruby Classes, Coe Setter & Getter metholes ndling: Types, Modules & ods & Constants, Cus reads, I/O Objects, R names, declaration, v y variables, arrays, sli types, functions, cont	reads & Fibers beject Instances, nods, Method Visibility Classes, Blocks & stom Structures, eading file, writing file.	7 7
I III IV	In B N N N C C C C C A M M M S S D In Ir ty	crief history of fumbers, Text & full) classes, Modules flow Control & fonditionals, Lo flasses, Modules fonditionals, Lo flasses, Modules flasses, Modules flasses, Modules flasses, Modules flasses, Modules flasses, Control flata-programmi flata-programmi frings, Variable flata-programmi flata-program	Ruby Programs Ruby, Installing & Strings, Arrays S & Objects: Obj Statements and ops, Error & Exc S & Objects: Sin itance, Persistence ites & Variables: Instance Var	& running Ruby, C & Hashes, Symbols ects, Classes, Variab d Properties ception Handling, The nple Ruby Classes, Coce Setter & Getter metholes ndling: Types, Modules & ods & Constants, Cus reads, I/O Objects, R names, declaration, v g variables, arrays, sli types, functions, cont ables:	reads & Fibers bject Instances, nods, Method Visibility Classes, Blocks & stom Structures, eading file, writing file.	7 7 6 6
I III IV V	In B N N N C C C C C A M M M S S D In Ir ty	crief history of fumbers, Text & fumbers, Text & fumbers, Text & fumbers, Text & fumbers, Modules & fumbers	Ruby Programs Ruby, Installing & Strings, Arrays S & Objects: Obj Statements and ops, Error & Exc S & Objects: Sin itance, Persistence ites & Variables: Instance Var	& running Ruby, C & Hashes, Symbols ects, Classes, Variab d Properties ception Handling, The nple Ruby Classes, Coce Setter & Getter metholes ndling: Types, Modules & ods & Constants, Cus reads, I/O Objects, R names, declaration, v g variables, arrays, sli types, functions, cont ables:	reads & Fibers bject Instances, nods, Method Visibility Classes, Blocks & stom Structures, eading file, writing file. rariables, assignments, ce crol statements, methods,	7 7 6 6

1	Davd Flanagan, Yukihiro Mataumoto, "The Ruby Programming Language: Everything You Need to Know", O'Reilly; 1st edition (12 February 2008)
2	Alan A. A. Donovan, Brian W. Kernighan, "The Go Programming Language", Pearson Education; First edition (1 February 2016)
	Zeatement, Tribe Contain (Trice and J. Zerre)
	References
1	Yukihiro Matsumoto, David Flanagan, " <i>The Ruby Programming Language</i> ", Shroff,1 st Edition, 2008.
2	Caleb Doxsey, "An Introduction to Programming in Go", CreateSpace Independent Publishing Platform (3 September 2012)
	Useful Links
1	https://onlinecourses.swayam2.ac.in/aic20_sp37/preview
2	https://www.javatpoint.com/ruby-tutorial
3	https://www.ruby-lang.org/en/documentation/quickstart/
4	https://gobyexample.com/
5	https://www.javatpoint.com/go-tutorial
6	https://www.coursera.org/specializations/google-golang

		CO-	PO Mapping			
		Programn	ne Outcomes	(PO)		
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3			1		
CO2		2				2
CO3			2	2		

The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

				ege of Engineering, Sided Autonomous Inst		
			•	Y 2023-24	iiiie)	
				rse Information		
Progra	amme		M.Tech. (CS and			
Class,			First Year M. Tech			
Cours			7IT514	, 2011 1		
Cours				ive – 1: Artificial Inte	elligence	
		uisites:	Probability and Lin		8	
		1	<u> </u>	8		
Te	eachin	g Scheme		Examination Sc	heme (Marks)	
Lectur	re	3 Hrs/week	MSE	ISE	ESE	Total
Tutori	ial	-	30	20	50	100
Practi	cal	-				
Intera	ction	-		Credi	ts: 3	
			Cou	rse Objectives		
1	Тос	ompare variou	is techniques in Ai	rtificial Intelligence		
2	Тое	laborate meth	odologies for vario	ous application area	s of Artificial Intelligen	nce
3				Artificial Intelligend		
			* *) with Bloom's Tax		
At the	end of		students will be abl	·		
CO1			l concepts of Artif			Apply
		-	_	onal structures of A	rtificial	Analyse
CO2		ligence	tootarar arra rarrotr	onar stractures or r		
CO3			stem in Artificial I	ntelligence		Create
	Dun	a an empere sy	300111 111 1 11 11 11 11 11 11 11 11 11 1	incingence .		Sicure
Modu	- 1					
				lule Contents		Hours
	A		Solving by Search	1		
I	A Ir	ntroduction to A	Solving by Search		Uninformed search,	Hours 7
	A Ir H	ntroduction to A	AI, Problem solving CSP problems	1	Uninformed search,	7
I	A In H	ntroduction to A leuristic search, Knowledge Rep	AI, Problem solving CSP problems oresentation	1		
II	A In H	ntroduction to A leuristic search, Inowledge Rep ntroduction, to a Inowledge Rea	A Solving by Search AI, Problem solving CSP problems oresentation Knowledge representsoning	as state space search, atation, First order log	gic-I	7
	A In H	ntroduction to A leuristic search, Inowledge Rep ntroduction, to a Inowledge Rea	A Solving by Search AI, Problem solving CSP problems Cresentation Knowledge represent Soning CII, Inference in First	as state space search,	gic-I	7
II	A In H	ntroduction to A leuristic search, Inowledge Rep ntroduction, to I Inowledge Rea irst order logic-	A Solving by Search AI, Problem solving CSP problems Cresentation Knowledge represent Soning CII, Inference in First	as state space search, atation, First order log	gic-I	7
II	A In H	ntroduction to A leuristic search, knowledge Rep ntroduction, to a knowledge Rea irst order logic- ecision network lanning ntroduction to F	A Solving by Search AI, Problem solving CSP problems Presentation Knowledge represent Soning II, Inference in First C	as state space search, atation, First order log	gic-I ian network,	7
III	A In H	ntroduction to A leuristic search, Inowledge Rep ntroduction, to a Inowledge Rea irst order logic- ecision network lanning ntroduction to E draphplan	A Solving by Search AI, Problem solving CSP problems Oresentation Knowledge represent Soning Old, Inference in First Coloration	as state space search, atation, First order log t order logic-I, Bayes	gic-I ian network,	7 7 6
II III IV	A In H	ntroduction to A leuristic search, foowledge Rep ntroduction, to a least order logic- ecision network lanning ntroduction to F draphplan	A Solving by Search AI, Problem solving CSP problems Presentation Knowledge represent Soning FII, Inference in First Collanning, Plan space Ing	as state space search, atation, First order log t order logic-I, Bayes planning, Planning g	gic-I ian network, graph and	7 7 6
III	A In H	ntroduction to A leuristic search, Knowledge Rep ntroduction, to I Knowledge Rea irst order logic- ecision network lanning ntroduction to F draphplan Machine Learn ntroduction to N	A Solving by Search AI, Problem solving CSP problems Presentation Knowledge represent Soning Fill, Inference in First Clanning, Plan space Ing ML, Learning decision	as state space search, atation, First order logict order logic-I, Bayes planning, Planning gon tress, Reinforcement	gic-I ian network, graph and	7 7 6 6
II III IV	A In H	ntroduction to A leuristic search, anowledge Reputroduction, to a learning of the Learn at roduction to B learning of the Learn at roduction to Meaning in neuroduction to Meaning in neuroduction to Meaning in neuroduction in learning in neuroduction to Meaning in	A Solving by Search AI, Problem solving CSP problems Presentation Knowledge represent Soning FII, Inference in First Collanning, Plan space Ing	as state space search, atation, First order logict order logic-I, Bayes planning, Planning gon tress, Reinforcement	gic-I ian network, graph and	7 7 6
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II III IV	A In H	ntroduction to Aleuristic search, nowledge Report and the control of the control	AI, Problem solving CSP problems resentation Knowledge represents soning II, Inference in First Planning, Plan space ing ML, Learning decisional network, Deep Learning Interpretation	as state space search, atation, First order logict order logic-I, Bayes planning, Planning gon tress, Reinforcementaring: A review.	gic-I ian network, graph and	7 7 6 6
II III IV V	A In H	Introduction to A leuristic search, anowledge Report anowledge Readirst order logic ecision network lanning attroduction to Foraphplan anowledge Learn attroduction to Mearning in neurosystems.	AI, Problem solving CSP problems resentation Knowledge represents soning II, Inference in First Planning, Plan space ing ML, Learning decisional network, Deep Learning Interpretation	as state space search, atation, First order logict order logic-I, Bayes planning, Planning gon tress, Reinforcementaring: A review.	gic-I ian network, graph and ent learning,	7 7 6 6
II III IV V	A In H	ntroduction to Aleuristic search, nowledge Report and the control of the control	A Solving by Search AI, Problem solving CSP problems Presentation Knowledge represent Soning Fill, Inference in First Clanning, Plan space Fing ML, Learning decisional network, Deep Learning Interview of the proposed of the proposed of the problem of the proble	as state space search, atation, First order log t order logic-I, Bayes planning, Planning g on tress, Reinforceme earning: A review. ents of Expert system	gic-I ian network, graph and ent learning,	7 7 6 6
II III IV V VI	A A In H	Introduction to Aleuristic search, anowledge Report anowledge Readirest order logic ecision network lanning attroduction to Aleuring in neuroduction to Mearning in neuroduction, Furnal stroduction, Furnal s	A Solving by Search AI, Problem solving CSP problems Oresentation Knowledge represent Soning Olanning, Plan space Ing ML, Learning decisional network, Deep Learning	as state space search, atation, First order logict order logic-I, Bayes planning, Planning gon tress, Reinforcementaring: A review. Text Books	gic-I ian network, graph and ent learning, as, Architecture of ES,	7 7 6 6 7 6
II III IV V	A In H	ntroduction to Aleuristic search, anowledge Report and the complete Readirst order logic ecision network lanning antroduction to Aleuring in neuroduction to Mearning in neuroduction, Furnal Report systems and troduction, Furnal Report Systems and Report	AI, Problem solving CSP problems oresentation Knowledge represents soning III, Inference in First Clanning, Plan space ing ML, Learning decisional network, Deep Learning ert system	as state space search, atation, First order log torder logic-I, Bayes planning, Planning gon tress, Reinforceme earning: A review. Fext Books Artificial Intelligence	gic-I ian network, graph and ent learning, as, Architecture of ES, ", McGraw Hills 3rd editions and the state of ES,	7 7 6 6 ion,1991
II III IV V VI	A A In H	ntroduction to Aleuristic search, anowledge Report and the complete Readirst order logic ecision network lanning antroduction to Aleuring in neuroduction to Mearning in neuroduction, Furnal Report systems and troduction, Furnal Report Systems and Report	A Solving by Search AI, Problem solving CSP problems Presentation Knowledge represent Soning Fill, Inference in First Clanning, Plan space Fing ML, Learning decisional network, Deep Learning Intionality /component system Vin Knight ,Nair, "A" Foundations of Artificial results and the system The solving by Search Research Re	as state space search, atation, First order logict order logic-I, Bayes planning, Planning gon tress, Reinforcements of Expert system artificial Intelligence and ificial Intelligence and assistance of the space of the system artificial Intelligence and ificial Intelligence and assistance of the system artificial Intelligence and intelligence an	gic-I ian network, graph and ent learning, as, Architecture of ES,	7 7 6 6 ion,1991
II III IV V VI	AA III H K K III K F d III II	Introduction to Aleuristic search, anowledge Report anowledge Readirst order logic ecision network lanning attroduction to Aleuring in neuroduction to Mearning in neuroduction, Furuilding an Expert systems attroduction, Furuilding an Expert systems and Kelexiraman et al., 2007.	A Solving by Search AI, Problem solving CSP problems Oresentation Knowledge represent Soning III, Inference in First Collanning, Plan space Ing ML, Learning decision and network, Deep Learning decision and network, Deep Learning decision and network of Artificial Nair, "A Foundations of Artificial Foundations of Artificial Plantage (Foundations of Artificial Problems)	as state space search, atation, First order logictorder logic-I, Bayes planning, Planning gon tress, Reinforcementaring: A review. Ext Books Artificial Intelligence and References	gic-I ian network, graph and ent learning, as, Architecture of ES, ", McGraw Hills 3rd editions and the state of ES,	7 7 6 6 7 6 ion,1991 Millan India

2	course on NPTEL/SWAYAM by Prof. Shyamanta M Hazarika , IIT Guwahati-" Fundamentals Of Artificial Intelligence"
	Useful Links
1	Module I,II,III https://onlinecourses.nptel.ac.in/noc19_me71/unit?unit=7&lesson=8
2	Module IV,V https://onlinecourses.nptel.ac.in/noc19_me71/unit?unit=16&lesson=17
3	Module VI Vlabs,iitb.ac.in

		CO-	PO Mapping			
		Programn	ne Outcomes	(PO)		
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1		3			
CO2		2				2
CO3	2			1		

The assessment is based on MSE, ISE and ESE.

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			Walchand Colle	ege of Engineering,	Sanoli			
				ided Autonomous Ins				
			<u>'</u>	AY 2023-24	,			
			Cour	se Information				
Progra	amme		M.Tech. (CS and	IT)				
Class,			First Year M. Tec	First Year M. Tech., Sem I				
Cours	e Cod	e	6IT513	·				
Cours	e Nam	ie	Professional Elect	tive - 2: Advanced D	Distributed Computing			
Desire	d Req	uisites:						
T	eachir	ng Scheme		Examination Sch	eme (Marks)			
Lectur		3 Hrs/week	MSE	ISE	ESE	Total		
Tutori	ial	-	30	20	50	100		
Practi	cal	-						
Intera	ction	-		Cred	its: 3			
		1	<u> </u>					
			Cou	rse Objectives				
1	To il	lustrate the vario		rn distributed system	IS			
2			listributed architect		<u> </u>			
3				puting applications				
) with Bloom's Tax	onomy Level			
At the	end of		students will be able	·	2010111			
CO1			various big data ana			Analyze		
CO2			broach to implement distributed environment			Analyze		
			y and performance of various algorithms of distributed			Evaluate		
CO3	syste		y and performance of various argorithms of distributed			Lvaraace		
	jojote							
Modu	ıle		Mod	lule Contents		Hours		
		ntroduction to I	Distributed Systen					
I				nc, Finish), Tasks in	Java's Fork/Join	6		
	- 1		` •	ork, Span, Multiprod				
			em with Parallelis		<u> </u>	1		
					using Async- Finish.			
II		Parallel Speedup, Amdahl's Law, Reciprocal Array Sum using Async-Finish, Reciprocal Array Sum using Recursive Action's in Java's Fork/Join						
		Framework						
		unctional Para	llelism:					
III	- 1			utures in Java's Fork/	Join Framework,	6		
	- 1			aces and Determinis				
			ronization and Pip					
				rs, Point-to-Point Syr	nchronization with			
IV	- 1	hasers,		•		7		
			Iterative Averagin	g with Phasers, Pipel	ine Parallelism, Data			
	F	low Parallelism						
	I	Distributed Map	Reduce:					
V	I	ntroduction to M	ap-Reduce, Hadoo	p Framework, Spark	Framework, TF-			
*	I	DF Example, Pag	ge Rank Example,	Demonstration: Page	Rank Algorithm in	7		
	$\underline{\hspace{1cm}}$	park						
		Client-Server Pr	ogramming:					
VI	I	ntroduction to So	ockets, Serialization	n/Deserialization, Rea	mote Method Invocation,			
VI				e Mode, Demonstrati	on: File	6		
	S	erver using Sock	cets					

Text Books

1	Andrew S. Tanenbaum and Maarten Van Steen, "Distributed Systems: Principles and
1	Paradigms", 2 nd edition, Pearson Education, 2007.
2	George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts and
2	Design", 4th Edition, Pearson Education, 2005.
	References
1	A. S. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second
1	Edition, Prentice Hall, 2006
	Useful Links
	Module I, II, III, IV
	https://www.coursera.org/learn/parallel-programming-in-java?specialization=pcdp#syllabus Module
1	V, VI
	https://www.coursera.org/learn/distributed-programming-in-java?specialization=pcdp#syllabus

		CC)-PO Mappin	g		
		Progran	nme Outcome	s (PO)		
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3		1			
CO2		1			2	
CO3	1			2		

The assessment is based on MSE, ISE and ESE. MSE

shall be typically on modules 1 to 3

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				lege of Engineering			
			(Government A	Aided Autonomous Ir	istitute)		
				AY 2023-24			
D				rse Information			
Progr			M. Tech (CS and IT) First Year M. Tech., Sem I				
1 '	Semes		7IT515	n., Sem I			
Course Code Course Name				2. D11-1 A1-			
Desired Requisites:			-	ive – 2: Parallel Alg	oritnms		
Desire	ea Keq	uisites:	Computer Algorith	1m			
T	eachin	g Scheme		Examination	Scheme (Marks)		
Lectu	re	3 Hrs/week	MSE	ISE	ESE	Total	
Tutor	ial	-	30	20	50	100	
Practi	ical	-					
Intera	ction	-		Cre	edits: 3		
				urse Objectives			
1				n Parallel Algorithm	S		
2			f parallelization in c	<u> </u>			
3	10 00		ad and process paral	O) with Bloom's Ta	avanamy I aval		
At the	and of		students will be abl		ixonomy Levei		
CO1		· · · · · · · · · · · · · · · · · · ·		ntial and parallel algorithms			
CO2			p factor of sequential and parallel algorithms			Apply Analyze	
CO3			· · · · · · · · · · · · · · · · · · ·			Create	
	1 (5 · · · · · ·	<u>r</u>				
Modu	ıle		Mod	dule Contents		Hours	
I			ng: Motivation and			6	
II				enACC, CUDA, OpenCL			
III			sor architecture and limitations of memory systems			6	
IV			organization of parallel platforms			7	
V			costs in parallel mad			7	
VI	R	outing mechani	sm and processor m	apping techniques		7	
				Text Books			
4	Anat	h Grama. Ansul	Gupta, George Kar	ypis, Vipin Kumar,	"Introduction to par	allel computing".	
1	Seco	nd Edition, Pea	rson Education, 200	3			
2			tkumar Sharma, <i>"Le</i>	arn CUDA Progran	nming", First Edition	n, Packt	
	publi	shing, 2019					
				References			
1	Horre	owitz, Sahni Ra	jasekaran, "Comput	er Algorithms", Con	nputer Science, W. I	H. Freeman	
1		company Press,		- · ·	·		
				Useful Links			
1	https	://nptel.ac.in/co	urses/106/102/1061				
2							
	-100PS	os://nptel.ac.in/courses/106/102/106102163/					

			CO-PO Mappi	ng					
	Programme Outcomes (PO)								
	PO1	PO2	PO3	PO4	PO5	PO6			
CO1	2			3					
CO2		2			1				
CO3			1	1					

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		Government	Aided Autonomous Institute) AY 2023-24	
		Co	ourse Information	
Progran	ıme	M. Tech. (CS and		
		First Year M. Ted	· · · · · · · · · · · · · · · · · · ·	
Class, Semester Course Code Course Name Desired Requisites:		7IT516	in, Sem I	
			tive – 2: Software Reliability and Testing	σ
		Software Engineer	•	5
csircu	requisites.	Software Enginee	ang	
Teac	ching Scheme		Examination Scheme (Marks)	
ecture	3 Hrs/week	MSE	ISE ESE	Total
utorial		30	20 50	100
ractica		30	20 30	100
iteract			Credits: 3	
		I	2-30-300	
		C	ourse Objectives	
1 7	To elaborate Softwa			
			for software development.	
			or software development.	
			CO) with Bloom's Taxonomy Level	
t the er	d of the course, the	<u> </u>	•	
	Apply concepts of S			Understand
			Models in Software Development	Analyze
	Evaluate the Softwa	<u> </u>		Analyze
				, ,
Iodule		Mod	ule Contents	Hours
	Basic of Softwa	re Testing:		
	Dasic of Softwa			
I			ow graph, Cyclomatic complexity, Grap	h 7
I	Software Testing Matrices, Debug	g, Testing types, Flagging & Test Case S		h 7
I	Software Testing	g, Testing types, Flagging & Test Case S		h 7
I	Software Testing Matrices, Debug Software Quality Software Quality	g, Testing types, Flogging & Test Case Sty: y Assurance, Softw	Strategies are Reuse, Documentation Requirements	s, 7
	Software Testing Matrices, Debug Software Quality Software Quality	g, Testing types, Flogging & Test Case Sty: y Assurance, Softw	Strategies	s, 7
	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliab	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration polity:	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline	s, 7
II	Software Testing Matrices, Debug Software Quality Software Quality Standards, Softw Software Reliab Software Reliab	g, Testing types, Flagging & Test Case Sty: y Assurance, Software Configuration bility: ility, Software Reli	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and	5, 7 S
	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliab Software Reliab Software Quality	g, Testing types, Flagging & Test Case Sty: y Assurance, Software Configuration bility: ility, Software Reli	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline	5, 7 S
II	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliable Software Reliable Software Quality Tools	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration pility: ility, Software Reli y Management, ISC	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and	5, 7 S
III	Software Testing Matrices, Debug Software Quality Software Quality Standards, Softw Software Reliab Software Reliab Software Quality Tools User Interface a	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration bility: ility, Software Reliaty Management, ISC	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 9 9000, Case Tools, Characteristics of Ca	s, 7 s 7
II	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliab Software Reliab Software Quality Tools User Interface a Concept of user	g, Testing types, Flagging & Test Case Sty: y Assurance, Software Configuration bility: ility, Software Relity Management, ISC and Design: Interface and Desig	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and	5, 7 S
III	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliable Software Reliable Software Quality Tools User Interface a Concept of user Based GUI Deve	g, Testing types, Flagging & Test Case Sty: y Assurance, Software Configuration bility: ility, Software Relity Management, ISC and Design: Interface and Designelopment	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 9 9000, Case Tools, Characteristics of Ca	s, 7 s 7
III	Software Testing Matrices, Debug Software Quality Software Quality Standards, Softw Software Reliable Software Quality Tools User Interface a Concept of user Based GUI Devel	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration polity: ility, Software Reli y Management, ISC and Design: Interface and Designelopment Detection:	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 0 9000, Case Tools, Characteristics of Ca	7 ase 7
III	Software Testing Matrices, Debug Software Quality Software Quality Standards, Softw Software Reliab Software Reliab Software Quality Tools User Interface a Concept of user Based GUI Devel Software Fault Basic terminolo	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration bility: ility, Software Reliay Management, ISC and Design: Interface and Designelopment Detection: gy of Fault tolera	are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 9 9000, Case Tools, Characteristics of Ca gn, Types of user Interface, Component ant, Fault detection using fault tree, F	7 sse 7
II III IV	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliable Software Reliable Software Quality Tools User Interface a Concept of user Based GUI Devel Software Fault Basic terminolo tolerant in SRE	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration bility: ility, Software Reliay Management, ISC and Design: Interface and Designelopment Detection: gy of Fault tolera	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 0 9000, Case Tools, Characteristics of Ca	7 sse 7
II III IV	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliable Software Reliable Software Quality Tools User Interface a Concept of user Based GUI Devel Software Fault Basic terminolo tolerant in SRE programming	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration pility: ility, Software Reli y Management, ISC and Design: Interface and Design elopment Detection: gy of Fault tolera , Techniques for I	are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 9 9000, Case Tools, Characteristics of Ca gn, Types of user Interface, Component ant, Fault detection using fault tree, F	7 sse 7
II III IV	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliable Software Reliable Software Quality Tools User Interface at Concept of user Based GUI Devel Software Fault Basic terminolo tolerant in SRE programming Software Fault	g, Testing types, Flagging & Test Case Sty: y Assurance, Software Configuration pility: ility, Software Reli y Management, ISC and Design: Interface and Design elopment Detection: gy of Fault tolera , Techniques for H	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 0 9000, Case Tools, Characteristics of Ca gn, Types of user Interface, Component ant, Fault detection using fault tree, Fault tolerant: Recovery blocks, N- ver	7 sse 7
III III IV	Software Testing Matrices, Debug Software Quality Standards, Software Reliable Software Reliable Software Quality Tools User Interface and Concept of user Based GUI Development of User Fault Basic terminology tolerant in SRE programming Software Fault Fault tree model	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration bility: ility, Software Relia y Management, ISC and Design: Interface and Design elopment Detection: gy of Fault tolera , Techniques for H Analysis: ling, Fault tree ana	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 9 9000, Case Tools, Characteristics of Ca gn, Types of user Interface, Component ant, Fault detection using fault tree, Fault tolerant: Recovery blocks, N- ver	7 sse 7
II III IV	Software Testing Matrices, Debug Software Quality Standards, Software Reliable Software Reliable Software Quality Tools User Interface and Concept of user Based GUI Development of User Fault Basic terminology tolerant in SRE programming Software Fault Fault tree model	g, Testing types, Flagging & Test Case Sty: y Assurance, Software Configuration pility: ility, Software Reli y Management, ISC and Design: Interface and Design elopment Detection: gy of Fault tolera , Techniques for H	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 9 9000, Case Tools, Characteristics of Ca gn, Types of user Interface, Component ant, Fault detection using fault tree, Fault tolerant: Recovery blocks, N- ver	7 sse 7 sealt sion 5
II III IV	Software Testing Matrices, Debug Software Quality Standards, Software Reliable Software Reliable Software Quality Tools User Interface and Concept of user Based GUI Development of User Fault Basic terminology tolerant in SRE programming Software Fault Fault tree model	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration bility: ility, Software Relia y Management, ISC and Design: Interface and Design elopment Detection: gy of Fault tolera , Techniques for H Analysis: ling, Fault tree ana	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 9 9000, Case Tools, Characteristics of Ca en, Types of user Interface, Component ant, Fault detection using fault tree, Fault tolerant: Recovery blocks, N- ver elysis, Analysis of fault tolerant software lt tolerant system	7 sse 7 sealt sion 5
II III IV V VI	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliable Software Reliable Software Quality Tools User Interface at Concept of user Based GUI Devel Software Fault Basic terminolo tolerant in SRE programming Software Fault Fault tree model system, Quantita	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration pility: ility, Software Reli y Management, ISC and Design: Interface and Design elopment Detection: gy of Fault tolera , Techniques for I Analysis: ling, Fault tree analysis of fautive analysis of fautive analysis of fautive analysis of fautive styres.	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 0 9000, Case Tools, Characteristics of Ca gn, Types of user Interface, Component ant, Fault detection using fault tree, Fault tolerant: Recovery blocks, N- ver aysis, Analysis of fault tolerant software lt tolerant system Text Books	7 ss 7 s
III IV V VI	Software Testing Matrices, Debug Software Quality Software Quality Standards, Software Reliable Software Reliable Software Quality Tools User Interface at Concept of user Based GUI Devel Software Fault Basic terminolo tolerant in SRE programming Software Fault Fault tree model system, Quantita	g, Testing types, Flaging & Test Case Sty: y Assurance, Software Configuration pility: ility, Software Reli y Management, ISC and Design: Interface and Design elopment Detection: gy of Fault tolera , Techniques for I Analysis: ling, Fault tree analysis of fautive analysis of fautive analysis of fautive analysis of fautive styres.	Strategies are Reuse, Documentation Requirements Management, Version Control, Baseline ability Issues, Statistical Testing and 9 9000, Case Tools, Characteristics of Ca en, Types of user Interface, Component ant, Fault detection using fault tree, Fault tolerant: Recovery blocks, N- ver elysis, Analysis of fault tolerant software lt tolerant system	7 sse 7 Sault sion 5

	References							
1 Musa John D., "Software Reliability Engineering", Tata McGraw Hill, 2 nd Edition, 1999								
	2	Lyu, "Software Reliability Engineering", IEEE Computer Society Press, 1st Edition, 1996						
	Useful Links							
1		Module I, II, III, IV, V - https://onlinecourses.nptel.ac.in/noc21_cs15/preview						

	CO-PO Mapping								
	Programme Outcomes (PO)								
	PO1 PO2 PO3 PO4 PO5 PO6								
CO1	2		2	1					
CO2	1					2			
CO3		2		3					

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Walchand College of Engineering, Sangli									
(Government Aided Autonomous Institute) AY 2023-24									
Course Information									
Programme MTech. (CS & IT)									
Class, Semester First year M. Tech., Sem I									
Course		7IT517	ecii., Seiii I						
	Name		tive - 2: IoT Systems	and Ar	nlications				
	- 100			anu Ap	prications				
Desired Requisites: Computer Networks									
Tea									
Lecture	e 3 Hrs/week	MSE	ISE		ESE	Total			
Futoria	al -	30	20		50	100			
	-			dits: 3					
				41051 0					
		Co	ourse Objectives						
1	To infer the concept		U						
2	To apply basic WSN								
3	To create IoT based								
			CO) with Bloom's Ta	xonom	ıy Level				
At the e	end of the course, the								
	,		Bloom's						
CO	Co	ourse Outcome Sta	atement/s		Taxonomy	Bloom's Taxonomy			
	Level					Description			
CO1	Apply IoT concept	in real time scenario	O		III	Applying			
CO2	Analyze use of WS				III	Applying			
CO3	Develop IoT enable	d services			VI	Creating			
Modul			ule Contents			Hours			
I	Introduction to		1. 6	ъ.		7			
			orking, Communicati	on Prot	tocols				
II	Sensor Network		1.11.	T		7			
			ons, Interoperability i	n Io I					
		oT Programming:	'.1 A 1 ' T .	1	. D. 4				
III	Integration of Sensors and Actuators with Arduino, Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with								
	1 0	itroduction to Rasp	berry Pi, implementat	.1011 01	101 With				
	Raspberry Pi Introduction to	CDM.							
IV		ta Handling and Analytics, Cloud Computing, Sensor-Cloud,				6			
1 4	Fog Computing	ita Handinig allu A	narytics, Cloud Comp	uung, i	Jenson-Chuu,				
	IOT Applicatio	n·							
V			nnected Vehicles, Sm	art Grid	d Industrial				
•	IoT	i biliart Homes, Co.	iniceted venicles, bin	art Orio	a, maasarar	6			
		riculture Healthcar	re, Activity Monitorin	ıσ		6			
VI	- Cast Study 1112			- o					
			Text Books						
1		d Vijay K. Madiset	ti, "Internet of Things	: A Ha	nds-on Approa	ch", VPT, 1 st			
	Edition, 2014	"Tle o internet of 1	ings" MIT Date 1 /	T.J.:4: -	2015				
2	Samuel Greengard,	ine internet of thi	ings", MIT Press, 1st	Edition	1, 2015				
			References						
1			"The Internet of Thing	gs: Ena	bling Technolo	gies, Platforms,			
	Land Has Cases" Cl	RC Press, 1 st edition	2017						

2	Adrian McEwen, Hakim Cassimally," <i>Designing the Internet Of Things</i> ", Wiley, 1 st Edition, 2013							
	Useful Links							
1	https://onlinecourses.nptel.ac.in/noc19_cs65/preview							

	CO-PO Mapping									
	Programme Outcomes (PO)									
	PO1 PO2 PO3 PO4 PO5 PO6									
CO1	1		2							
CO2			3							
CO3	2									

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	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
AY 2023-24										
Course Information										
Programme M.Tech. (CS and IT)										
Class,	Semester	First Year N	M. Tech., Sem I							
Course Code 7IT518										
Course Name Professional Elective - 2: Image Processing and Pattern Recognition										
Desired Requisites: Mathematics-(Matrix, Fourier Transformation)										
Те	eaching Scheme	2	Examination Scheme (Marks)							
Lectui	re 3 Hrs/w	eek MSI	E ISE ESE	Total						
Futor i	ial -	30	20 50	100						
Practi	cal -									
Intera	ction -		Credits: 3							
			Course Objectives							
1			ation for image processing							
2		nage enhancement								
3	To elaborate in	nage processing ap								
			es (CO) with Bloom's Taxonomy Level							
		se, the students will	· · · · · · · · · · · · · · · · · · ·							
CO1			e processing for real-time application	Apply						
CO2			nd representation techniques	Apply						
CO3	Analyze image	es in the frequency	domain using various transforms	Analyze						
N	1		M I I C 4 4	TT						
Modu			Module Contents	Hours						
		Introduction and Pixel Relationship Need for Image Processing, Some Applications of Image Processing-								
I			mponents of digital image processing,	7						
1										
	1 2	sampling, quantization, Pixel Relationships in images, Distance measurements, Data structure for image representation								
		erations and Inter	<u> </u>							
II			operations, Geometrical operations, Image	7						
_		on techniques	,,							
III	Image Transformation									
		Need of transformation, DFT and properties, convolution Theorem, DCT								
	Image Enhancement									
	0	nancement		6						
IV	0	nancement	ring techniques, Frequency domain filtering	6						
IV	Point opera Image Seg	nancement ations ,Spatial filter mentation								
	Point opera Image Seg Classificati	nancement ations ,Spatial filter mentation on of Image se	gmentation, Edge detection, Thresholding	10						
IV	Point opera Image Seg Classificati techniques	nancement ations ,Spatial filter mentation on of Image se , Region growing to	gmentation, Edge detection, Thresholdinechniques							
IV	Point opera Image Seg Classificati techniques Pattern Re	nancement ations ,Spatial filter mentation on of Image se , Region growing to ecognition Fundar	gmentation, Edge detection, Thresholdinechniques mentals	ng 7						
IV V	Point opera Image Seg Classificati techniques Pattern Re Basic cone	nancement nations ,Spatial filter mentation on of Image se , Region growing to ecognition Fundar cepts of pattern in	gmentation, Edge detection, Thresholdinechniques mentals recognition, fundamental problems in patte	ng 7						
IV	Point opera Image Seg Classificati techniques Pattern Re Basic concrecognition	mancement ations ,Spatial filter mentation and of Image se , Region growing to ecognition Fundar cepts of pattern in system, design	gmentation, Edge detection, Thresholding chniques mentals recognition, fundamental problems in patter concepts and methodologies, example	ng 7						
IV V	Point opera Image Seg Classificati techniques Pattern Re Basic con- recognition automatic p	mancement ations ,Spatial filter mentation and of Image se , Region growing to ecognition Fundar cepts of pattern in system, design	gmentation, Edge detection, Thresholdinechniques mentals recognition, fundamental problems in patte	ng 7						
IV V	Point opera Image Seg Classificati techniques Pattern Re Basic concrecognition	mancement ations ,Spatial filter mentation and of Image se , Region growing to ecognition Fundar cepts of pattern in system, design	gmentation, Edge detection, Thresholding chniques mentals recognition, fundamental problems in patter concepts and methodologies, example	ng 7						
IV V	Point opera Image Seg Classificati techniques Pattern Re Basic con- recognition automatic p	mancement ations ,Spatial filter mentation and of Image se , Region growing to ecognition Fundar cepts of pattern in system, design	gmentation, Edge detection, Thresholding chniques mentals recognition, fundamental problems in patter concepts and methodologies, example systems, a simple automatic pattern recognition	ng 7						
IV V	Point opera Image Seg Classificati techniques Pattern Re Basic cone recognition automatic p	nancement nations ,Spatial filter mentation non of Image se n Region growing to ecognition Fundar cepts of pattern in n system, design pattern recognition	gmentation, Edge detection, Thresholding echniques mentals recognition, fundamental problems in patter concepts and methodologies, example systems, a simple automatic pattern recognition. Text Books	ng 7 rn of 6						
IV V VI	Point opera Image Seg Classificati techniques Pattern Re Basic con- recognition automatic p model S.Shridhar, "L	nancement nancement nancement nancement nancement mentation non of Image se nancement	gmentation, Edge detection, Thresholding techniques nentals recognition, fundamental problems in patter concepts and methodologies, example systems, a simple automatic pattern recognition Text Books essing", Oxford University Press, 2nd Edition, 20	rm of on 6						
IV V	Point opera Image Seg Classificati techniques Pattern Re Basic con- recognition automatic p model S.Shridhar, "L Millan sonka,"	nancement nancement nancement nancement nancement mentation non of Image se nancement	gmentation, Edge detection, Thresholding echniques mentals recognition, fundamental problems in patter concepts and methodologies, example systems, a simple automatic pattern recognition. Text Books	ng 7 rm of 6 016.						

References									
1	S. Jayraman, S Esakkiarajan, Veerakumar, "Digital image processing", 1st Edition, MGH, 2017.								
2	Rafel C. Gonzalez, Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson								
2	Education, 2008								
Useful Links									
1	Module I,II,III								
1	https://nptel.ac.in/courses/117/105/117105079/								
2	Module IV,V								
	https://nptel.ac.in/courses/106/105/106105223/								
3	Module VI								
3	Vlabs,iitb.ac.in								

CO-PO Mapping									
Programme Outcomes (PO)									
	PO1	PO2	PO3	PO4	PO5	PO6			
CO1	3			1					
CO2		2				2			
CO3	1		1						

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

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SEMESTER -II

			alchand College						
	(Government Aided Autonomous Institute) AY 2023-24								
				Information					
Programme	<u> </u>		M. Tech. (CS a						
Class, Seme			First Year M. T	<u> </u>					
Course Cod			7IT521						
Course Nan			Data Mining M	ethods and Appl	lications				
Desired Rec			Database Engin						
2 0311 00 1100	102320		2 mmemot Erigin	8					
Teachir	ng Sch	eme			nation Scheme (Marks)				
Lecture		3 Hrs/week	MSE	ISE	ESE	Total			
Tutorial		-	30	20	50	100			
Practical		-		1	1				
Interaction		-		(Credits: 3				
			Course	e Objectives					
1	Тое	xercise advance	d data mining tec	hniques					
2			algorithm for rea		on				
3	Тор		solution for real						
A1 1	C .1		Outcomes (CO) v		axonomy Level				
CO1		·	nts will be able to	·		A nnlr			
CO2			es and algorithms			Apply Apply			
CO3			echniques and algorithms for solving real life problems stering and classification techniques in data mining			Analyse			
	1	-,				<i>J</i> ~ -			
Module			Mod	ule Contents		Hours			
	I	ntroduction :							
			nds of Data, Kin	ds of Patterns,	Γechnologies, Major Issues				
I		in Data Mining. Getting to Know Your Data: Data Objects and Attribute							
	Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring								
			nd Dissimilarity						
II		Data Pre-proces Data Cleaning I	0	Data Reduction	Data Transformation	6			
11		nd Data Discret	•	Data Reduction,	Data Transformation				
		Mining Frequer							
III Basic Concepts, F Evaluation Metho			Frequent Item set	t Mining Method	ds, Pattern	7			
			ods.						
		Classification	D	1 4 5 6	71 'C' ,' 3.# ,1 1				
IV					Classification Methods,	6			
			sification, Model cation Accuracy	Evaluation and	Selection, Techniques to				
		Cluster Analysi							
V				thods, Hierarchi	cal Methods, Density-Based	7			
			ased Methods, E			/			

VI	Outlier Detection Outliers and Outliers and Outliers, Proclassification-Boutliers, Outliers, Outliers	Outlier Ana oximity-Bas ased Appr	sed Approaroaches, M	ches, Cluste lining Con	ering-Based textual and	Approaches,	6		
			Text Boo	ks					
1	Han Jiawei and Kar Kaufmann Series in	nber Michel Data Mana	line "Data N gement Syst	Mining – Coltems ,3 rd Ed	ncepts and Tition, 2011	Techniques" T	The Morgan		
2	Dunham M. H, "Do					, Pearson, 2 nd	Edition, 2003		
			<u> </u>						
			Reference	ees					
	Chattamvelli Rajan House, 2 nd Edition,	, " <i>Data Mir</i> 2010	ing Method	ls: Concepts	& Applicati	ions", Narosa	Publishing		
2	Mitra Sushmita, Ac WILEY Publication			ning Multim	edia, Soft C	omputing and	Biometrics",		
			Useful Li	nks					
1	https://onlinecourse	s.nptel.ac.ir	n/noc20_cs1	2/preview					
2	https://www.javatpo	oint.com/da	ta-mining						
3	https://data-flair.tra	ining/blogs/	data-mining	g-tutorial/					
			CO-PO Ma	pping					
	Programme Outcomes (PO)								
	PO1 PO2 PO3 PO4 PO5 PO6								
	CO1	3				1			
	CO2		2		2	-			
	CO3	1		1					
	003	1		1					

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			ege of Engineering,			
			AY 2023-24			
			rse Information			
Progra	mme	M. Tech. (CS and	IT)			
	Semester	First Year M. Tec				
Course	e Code	7IT522				
Course	Course Name Scientific Computing					
Desire	d Requisites:	Programming exp	erience in C, C++, J	ava		
То	aching Scheme		Evamination S	cheme (Marks)		
Lectur		MSE	ISE	ESE	Total	
Tutoria		30	20	50	100	
Practic		30	20	30	100	
Interac			Cred	lits: 3		
mici al	ction -	1	Crec	uto. J		
		Cou	rse Objectives			
1	To use different pro		•	uting.		
2	To apply appropriate					
3	To demonstrate repo			•		
) with Bloom's Tax	konomy Level		
At the	end of the course, the			<u> </u>		
CO1	Compare functional				Analyze	
CO2	Use Python program				Apply	
CO3	Implement scripts to				Apply	
	<u> </u>				TF J	
Modul			dule Contents		Hours	
	Introduction to Data Science and Scientific Computing-					
_ <u> </u>					_	
1	Overview of the	ne Data Science pr	ocess, Scientific C		, 7	
1	Overview of the Regressions, Cla	ne Data Science pr assification, Clusteria	ocess, Scientific C		, 7	
1	Overview of the Regressions, Class Python-Numpy	ne Data Science prassification, Clusterinand Pandas:	ocess, Scientific C	Computing Technologies	, 7	
II	Overview of the Regressions, Clack Python-Numpy NumPy: Introduction	ne Data Science pr assification, Clusterinand Pandas: action, Numpy array	ocess, Scientific C ng , Numpy array index	Computing Technologies sting, Numpy operations.	, 7	
	Overview of the Regressions, Classification Python-Numpy NumPy: Introduce Pandas: Series,	ne Data Science prassification, Clusterinand Pandas: action, Numpy array Data frames, manag	ocess, Scientific C ng , Numpy array index ing missing data, gr	Computing Technologies sting, Numpy operations.		
	Overview of the Regressions, Classian Python-Numpy NumPy: Introduce Pandas: Series, concatenation, o	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input	ocess, Scientific C ng , Numpy array index ing missing data, gr	Computing Technologies sting, Numpy operations.		
П	Overview of the Regressions, Classification Python-Numpy NumPy: Introduce Pandas: Series, concatenation, of Python for Data	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization:	ng Numpy array indexing missing data, grand data output.	Computing Technologies sting, Numpy operations. oupby, merging &	6	
	Overview of the Regressions, Classian Python-Numpy NumPy: Introduce Pandas: Series, concatenation, oo Python for Data Data Visualization	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, managerations, data input a Visualization: on through libraries	ng Numpy array indexing missing data, grand data output.	Computing Technologies sting, Numpy operations.	6	
П	Overview of the Regressions, Classian Python-Numpy NumPy: Introdu Pandas: Series, concatenation, o Python for Data Data Visualization Geographical Planta Pl	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries of thing.	ng Numpy array indexing missing data, grand data output.	Computing Technologies sting, Numpy operations. oupby, merging &	6	
III	Overview of the Regressions, Classian Python-Numpy NumPy: Introduce Pandas: Series, concatenation, of Python for Data Data Visualization Geographical Plands Working with I	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries otting. Data in R —	Numpy array indexing missing data, grand data output.	Computing Technologies ting, Numpy operations. oupby, merging & aborn, Plotly and Cufflinks	6 , 6	
П	Overview of the Regressions, Classian Python-Numpy NumPy: Introduce Pandas: Series, concatenation, oo Python for Data Data Visualization Geographical Plant Python Working with I Variables, Vector	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries of thing. Data in R — ors, Matrices, lists &	ng, Numpy array indexing missing data, grand data output. like: Matplotlib, Sea	cal vectored operators	6	
III	Overview of the Regressions, Clast Python-Numpy NumPy: Introduct Pandas: Series, concatenation, of Python for Data Data Visualization Geographical Pletworking with I Variables, Vector Image data type,	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries of thing. Data in R — ors, Matrices, lists &	ng, Numpy array indexing missing data, grand data output. like: Matplotlib, Seat Data frames, Logion, categorical data u	cal vectored operators	6 , 6	
II III IV	Overview of the Regressions, Classians, Classians, Classians, Classians, Classians, Classians, Concatenation, Oscillation, Classians, Classians	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries of the conting. Data in R — ors, Matrices, lists & Image representation using libraries utilization using libraries lists and the continuous prossibility and the	Numpy array indexing missing data, grat and data output. like: Matplotlib, Seatt Data frames, Logion, categorical data upraries –	cal vectored operators asing Factors in R	6 , 6	
III	Overview of the Regressions, Classians, Classians, Classians, Classians, Classians, Classians, Classians, Classians, Concatenation, Oscillation, Oscillation, Classians, Concatenation, Oscillation, Concatenation, C	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries otting. Data in R — ors, Matrices, lists & Image representation using libraries dualization using libraries dualization using libraries dualization data, Basic	Numpy array indexing missing data, grand data output. like: Matplotlib, Seaton, categorical data upraries —	cal vectored operators	6 , 6	
II III IV	Overview of the Regressions, Classians, Classians, Classians, Classians, Classians, Classians, Classians, Classians, Concatenation, Oscillation, Oscillation, Classians, Concatenation, Oscillation, Concatenation, C	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries otting. Data in R — ors, Matrices, lists & Image representation using libraries data, Basic ded plotting using late and Panda in Red	Numpy array indexing missing data, grand data output. like: Matplotlib, Seaton, categorical data upraries —	computing Technologies ting, Numpy operations. oupby, merging & aborn, Plotly and Cufflinks cal vectored operators using Factors in R pulating the plotting	6 7	
II III IV	Overview of the Regressions, Classians, Classians, Classians, Classians, Classians, Classians, Classians, Classians, Concatenation, Oscillation, Osc	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries of thing. Data in R — ors, Matrices, lists & Image representation using libraries data, Basic ced plotting using large tools	Numpy array indexing missing data, grand data output. like: Matplotlib, Seaton, categorical data upraries —	computing Technologies ting, Numpy operations. oupby, merging & aborn, Plotly and Cufflinks cal vectored operators using Factors in R pulating the plotting	6 7	
II III IV	Overview of the Regressions, Classions, Classions, Classions, Classions, Classions, Classions, Concatenation, on Python for Datasions Data Visualization Geographical Plassions Working with I Variables, Vector Image data type, Data/Image Visualization Using graphs to window, Advance Image processing Data Reporting LATEX Software	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries otting. Data in R—ors, Matrices, lists & Image representation using libraries data, Basic end plotting using large tools gusing LaTeX—re installation, LATE	Numpy array indexing missing data, grand data output. like: Matplotlib, Seat Data frames, Logion, categorical data upraries — explotting in R, Manittice library in R. ImeEX typesetting basic	cing, Numpy operations. coupby, merging & aborn, Plotly and Cufflinks cal vectored operators asing Factors in R pulating the plotting age visualization in using	6 , 6 7	
II III IV	Overview of the Regressions, Classions, Classions, Classions, Classions, Classions, Classions, Concatenation, on Python for Datasions Data Visualization Geographical Plassions Working with I Variables, Vector Image data type, Data/Image Visualization Using graphs to window, Advance Image processing Data Reporting LATEX Software	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, managerations, data input a Visualization: on through libraries of ting. Data in R— ors, Matrices, lists & Image representation using libraries ded plotting using late g tools gusing LaTeX—	Numpy array indexing missing data, grand data output. like: Matplotlib, Seat Data frames, Logion, categorical data upraries — explotting in R, Manittice library in R. ImeEX typesetting basic	cing, Numpy operations. coupby, merging & aborn, Plotly and Cufflinks cal vectored operators asing Factors in R pulating the plotting age visualization in using	6 7	
II III IV	Overview of the Regressions, Classions, Classions, Classions, Classions, Classions, Classions, Concatenation, on Python for Datasions Data Visualization Geographical Plassions Working with I Variables, Vector Image data type, Data/Image Visualization Using graphs to window, Advance Image processing Data Reporting LATEX Software	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries of ting. Data in R — ors, Matrices, lists & Image representation using libraries data, Basic ced plotting using large tools gusing LaTeX — re installation, LATE les and matrices, Matrices, Matrices, Matrices, Matrices, Matrices and matrices, Matrices, Matrices, Matrices, Matrices, Matrices and matrices, Matrices, Matrices, Matrices and Mat	Numpy array indexing missing data, grand data output. like: Matplotlib, Seat Data frames, Logion, categorical data upraries — e plotting in R, Manittice library in R. Im EX typesetting basic athematics in Latex	cing, Numpy operations. coupby, merging & aborn, Plotly and Cufflinks cal vectored operators asing Factors in R pulating the plotting age visualization in using	6 , 6 7	
II III IV	Overview of the Regressions, Clast Python-Numpy NumPy: Introduct Pandas: Series, concatenation, of Python for Data Data Visualization Geographical Plant Working with I Variables, Vector Image data type, Data/Image Visualization Using graphs to window, Advance Image processing Data Reporting LATEX Software typesetting, Table	ne Data Science prossification, Clusterinand Pandas: action, Numpy array Data frames, manag perations, data input a Visualization: on through libraries otting. Data in R — ors, Matrices, lists & Image representation visualization using lib visualize data, Basic ced plotting using lar g tools g using LaTeX — re installation, LATH les and matrices, Ma	Numpy array indexing missing data, grand data output. like: Matplotlib, Seat Data frames, Logion, categorical data upraries — exploiting in R, Manittice library in R. ImeEX typesetting basic athematics in Latex Fext Books	computing Technologies ring, Numpy operations. roupby, merging & aborn, Plotly and Cufflinks cal vectored operators using Factors in R pulating the plotting uage visualization in using s, LATEX math	6 , 6 7 7	
II III IV	Overview of the Regressions, Clast Python-Numpy NumPy: Introduct Pandas: Series, concatenation, of Python for Data Data Visualization Geographical Plet Working with It Variables, Vector Image data type, Data/Image Visual Using graphs to window, Advance Image processing Data Reporting LATEX Software typesetting, Tablet	ne Data Science prossification, Clusterinand Pandas: action, Numpy array Data frames, manag perations, data input a Visualization: on through libraries otting. Data in R — ors, Matrices, lists & Image representation visualization using lib visualize data, Basic ced plotting using lar g tools g using LaTeX — re installation, LATH les and matrices, Ma	Numpy array indexing missing data, grand data output. like: Matplotlib, Seat Data frames, Logion, categorical data upraries — exploiting in R, Manittice library in R. ImeEX typesetting basic athematics in Latex Fext Books	cing, Numpy operations. coupby, merging & aborn, Plotly and Cufflinks cal vectored operators asing Factors in R pulating the plotting age visualization in using	6 , 6 7 7	
III IV V VI	Overview of the Regressions, Clast Python-Numpy NumPy: Introduct Pandas: Series, concatenation, of Python for Data Data Visualization Geographical Plant Working with I Variables, Vector Image data type, Data/Image Visualization Using graphs to window, Advance Image processing Data Reporting LATEX Software typesetting, Table	ne Data Science prossification, Clusterinand Pandas: action, Numpy array Data frames, manag perations, data input a Visualization: on through libraries otting. Data in R — ors, Matrices, lists & Image representation visualization using lib visualize data, Basic ced plotting using lar g tools g using LaTeX — re installation, LATH les and matrices, Ma	Numpy array indexing missing data, grand data output. like: Matplotlib, Seat Data frames, Logion, categorical data upraries — exploiting in R, Manittice library in R. ImeEX typesetting basic athematics in Latex Fext Books	computing Technologies ring, Numpy operations. roupby, merging & aborn, Plotly and Cufflinks cal vectored operators using Factors in R pulating the plotting uage visualization in using s, LATEX math	6 , 6 7 7	
III IV V VI	Overview of the Regressions, Clast Python-Numpy NumPy: Introduct Pandas: Series, concatenation, of Python for Data Data Visualization Geographical Plet Working with It Variables, Vector Image data type, Data/Image Visual Using graphs to window, Advance Image processing Data Reporting LATEX Software typesetting, Tablet	ne Data Science prossification, Clustering and Pandas: action, Numpy array Data frames, manage perations, data input a Visualization: on through libraries otting. Data in R — ors, Matrices, lists & Image representation using libraries data, Basic ced plotting using large tools gusing LaTeX — re installation, LATE les and matrices, Matrices, Matrices, Matrices, Matrices, Matrices, Matrices and matrices,	Numpy array indexing missing data, grand data output. like: Matplotlib, Seat Data frames, Logion, categorical data upraries — exploiting in R, Manittice library in R. ImeEX typesetting basic athematics in Latex Fext Books	computing Technologies ring, Numpy operations. roupby, merging & aborn, Plotly and Cufflinks cal vectored operators using Factors in R pulating the plotting uage visualization in using s, LATEX math	6 , 6 7 7 6	

1	Gilbert Strang, "Introduction to linear algebra", Wellesley-Cambridge Press, 5 th Edition, August 2016
2	Douglas Montgomery, "Applied statistics and probability for engineers", 6 th Edition, Wiley Publications, January 2016
	Useful Links
1	https://onlinecourses.nptel.ac.in/noc20_cs36/course
2	https://spoken-tutorial.org/watch/Python+3.4.3/Plotting+Data/English/

CO-PO Mapping							
	Programme Outcomes (PO)						
	PO1 PO2 PO3 PO4 PO5 PO6						
CO1	2		2			1	
CO2					2		
CO3		1	3				

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				lege of Engineer			
				Aided Autonomous	s Institute)		
				AY 2022-23			
D				rse Information			
Progra		-4	M. Tech. (CS and	*			
Class,			First Year M. Tecl	n., Sem II			
Cours			7IT523				
Cours			Agile Developmer	nt (Theory)			
Desire	d Req	uisites:					
		g Scheme			n Scheme (Marks)		
Lectur	e	3Hrs/week	MSE	ISE	ESE		Total
Tutori		-	30	20	50		100
Practi	cal	-					
Intera	ction	-		C	redits: 3		
			Co	urse Objectives			
1	To d	efine basics of	Software Testing an	nd techniques.			
2	To el	aborate projec	t management for se	oftware developm	ent.		
3	To il	lustrate Agile	development technic	ques for software	development.		
			urse Outcomes (Co		Taxonomy Level		
		· · · · · · · · · · · · · · · · · · ·	e students will be al				
CO1			automation testing				Apply
CO2	sche	duling.			planning, risk ana	llysis,	Apply
CO3	Eval	uate software o	development life cyc	cle using Agile to	ols and DevOps.		Evaluate
Modu	le		Mod	ule Contents			Hours
	S	oftware Testi	ng Introduction:				
	Iı	ntroduction, In	nportance of Softwa	re testing, How to	conduct Software te	sting,	7
I		Introduction, Importance of Software testing, How to conduct Software testing, Basic terminology of Software testing, Manual Testing Process, Difference					
		between Manual and Automated Testing, Software testing Roles and					
			s, V Model of Softw	are Development			
			gn Techniques				
II					Test Techniques, Wh		6
		ox Test Techni esting	iques, Experience-b	ased Test Technic	ques, Levels of Softw	are	
		ypes of Softw	ara Testing				
			_	g. Integration Tes	ting, System Testing,	User	6
***			ting, Sanity/Smoke				O
III					Load, Stress, Spike ar	nd	
					Testing, Reliability		
		esting, Securit	• •				
		roject Manag					
<u>-</u>			_	-	ysis/Design, Planning	- 1	7
IV					Leadership, Team		
					arce Allocation, Sof	tware	
		uanty manage	ement Software Tes	ing Standards			

V	and Agile Approaches, Status of Testing in Agile Projects, Role and Skills of a Tester in an Agile Team, Agile Testing Methods, Assessing Quality Risks and Estimating Test Effort, Techniques in Agile Projects, Tools in Agile Projects				
VI	DevOps Testing DevOps, Version control with Git, Git, Jenkins, Maven, Integration with				
	Text Books				
1	Glenford J. Myers, Corey Sandler, Tom Badgett, "The Art of Software Testing", Wiley, 2011, ISBN: 978-1-118-13315-6				
2		Ron Patton, Corey Sandler, Tom Badgett, "Software Testing", Second edition, Sams, 2005			
3	Lisa Crispin and Janet Gregory, "Agile Testing: A Practical Guide for Testers and Agile Teams", First edition, Addison-Wesley Signature Series, 2009				
4	Teresa Luckey, Joseph Phillips, "Software Project Management For Dummies", First edition, Wiley, 2006, ISBN: 9780471749349				
	References				
1	Lee Copeland, "A Practitioner's Guide to Software Test Design", First edition, 2003, ISBN-13: 978-1580537919.	·			
2	Joakim Verona · " <i>Practical DevOps</i> ", First edition, Artech House, 2019 9781785886522, 1785886525.	6, ISBN-13:			
	lenry· "Software Project Management: A Real-World Guide To Success", First edition, Pearson				
3	Education, 2004, ISBN- 9788131717929, 8131717925				
	Useful Links				
1	https://www.javatpoint.com/software-testing-tutorial				
2	https://www.guru99.com/software-testing.html				
3	https://www.getzephyr.com/insights/developing-devops-testing-strategy-benefits-be tools				
4	https://www.softwaretestinghelp.com/agile-scrum-methodology-for-development-ar	nd-testing/			

CO-PO Mapping						
	Programme Outcomes (PO)					
	PO1 PO2 PO3 PO4 PO5 PO6					
CO1	2		2			1
CO2					2	
CO3		1	3			

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	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)				
	AY 2023-24				
	Course Information				
Programme	M. Tech. (CS and IT)				
Class, Semester First Year M. Tech., Sem II					
Course Code 7IT571					
Course Name	Course Name Data Mining Methods and Applications Lab				
Desired Requisites:	Data Mining				

Teachin	hing Scheme Examination Scheme (Mar						
Lecture	-	LA1 LA2 ESE Total					
Tutorial	-	30	30	40	100		
Practical	2 Hrs/Week						
Interaction	-		Cred	lits: 1			

	Course Objectives				
1	To introduce student with concept of data mining				
2	To provide knowledge applications of Data Mining applications.				
3	To help students to address real-world challenges using Data mining algorithms.				
	Course Outcomes (CO) with Bloom's Taxonomy Level				
At the	end of the course, the students will be able to,				
CO1	Implement the software application using for data mining algorithm.	Apply			
CO2	Write & explain a detailed project report for submission and evaluation.	Evaluate			
CO3	Design and validate system for Data mining	Create			

List of Experiments / Lab Activities

List of Experiments:

Activities are to be carried out individually.

Each student will perform the activity based on course on following areas.

- 1. Design system for data analysis using data mining algorithms.
- 2. The system work on data set with different algorithm like classification, clustering, association, etc.
- 3. Industry Problem Statement(Sponsored Project)
- 4. Problem statements based on current or previously learned Technology.
- 5. At the end of the semester project group should achieve all the proposed objectives of the problem statement.
- 6. The work should be completed in all aspects of design, implementation and testing and follow software engineering practices.
- 7. Project report should be prepared and submitted in soft and hard form along with all the code and other dependency.

Student should perform the activities on the basis of the real-time applications in the subjects and submit the work with code, PPT, PDF, Text report document & reference material or on online GitHub.

Students should maintain activity log book containing weekly progress.

	Text Books
1	Han Jiawei and Kamber Micheline "Data Mining – Concepts and Techniques" The Morgan
	Kaufmann Series in Data Management Systems ,3rd Edition, , 2011
2	Dunham M. H, "Data Mining: Introductory and Advanced topics", Pearson, 2ndEdition,
	2003

	References					
1	Chattamvelli Rajan, " <i>Data Mining Methods: Concepts & Applications</i> ", Narosa Publishing House, 2 nd Edition, 2010					
2	Mitra Sushmita, Acharya Tinku, "Data Mining Multimedia, Soft Computing and Biometrics", WILEY Publication, 3 rd Edition, 2003					
	Useful Links					
1	https://onlinecourses.nptel.ac.in/noc20_cs12/preview					
2	https://www.javatpoint.com/data-mining					

CO-PO Mapping							
		Programme Outcomes (PO)					
	PO1 PO2 PO3 PO4 PO5 PO6						
CO1	1		2		1		
CO2		1					
CO3	3			3			

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks	
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	30	
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	30	
LA2	Lab activities, Lab Course During Week 7 to Week 12		During Week 7 to Week 12	30	
LA2	attendance, journal	Faculty	Marks Submission at the end of Week 12	30	
Lab ESE	Lab activities, Lab Course During Week 13		During Week 13	40	
Lauese	attendance, journal	Faculty	Marks Submission at the end of Week 13	40	

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

	Walchand College of Engineering, Sangli		
	(Government Aided Autonomous Institute)		
	AY 2023-24		
	Course Information		
Programme	M. Tech. (CS and IT)		
Class, Semester	First Year M. Tech., Sem II		
Course Code	7IT572		
Course Name Scientific Computing lab			
Desired Requisites: Programming experience in C,C++,Java			

Teaching Scheme		Examination Scheme (Marks)				
Lecture	-	LA1	LA1 LA2 Lab ESE Total			
Tutorial	-	30	30	40	100	
Practical	2 Hrs/Week					
Interaction	-	Credits: 1				

	Course Objectives			
1	To use different programming paradigms in scientific computing.			
2	To apply appropriate programming language for solving the problem			
3	To demonstrate report writing using LATEX tool.			
	Course Outcomes (CO) with Bloom's Taxonomy Level			
At the	end of the course, the students will be able to,			
CO1	Perform numerical computation using python libraries	Analyze		
CO2	Implement statistical computation using R libraries	Apply		
CO3	Compose the journal paper, reports using Open source tool (LATEX)	Create		

List of Experiments / Lab Activities

Activities:

Activities are to be carried out individually.

Each student will perform the activity based on course on following areas.

- 1. Exercise programs on Lists.
- 2. Exercise programs on Tuples.
- 3. Exercise programs on sets and dictionaries
- 4. Exercise programs on files.
 - a) Write Python script to display file contents.
 - b) Write Python script to copy file contents from one file to another.
- 5. Data visualization plots in R
- 6. Exercise programs on Vectors, Matrices, lists in R
- 7. Exercise programs on Data frames and factors in R
- 8. Exercise program on image libraries using R
- 9. Create a journal paper using open source tool LATEX
- 10. Create a seminar/project report using open source tool LATEX

Student should perform the activities on the basis of the real-time applications in the subjects and submit the work with code, PPT, PDF, Text report document & reference material or on online GitHub. Students should maintain activity log book containing weekly progress.

	Text Books
1	Douglas Montgomery, "Applied statistics and probability for engineers", 6 th Edition, Wiley Publications, January 2016
2	Samir Madhavan, "Mastering Python for Data Science", August 2015, Packt Publishing, ISBN: 9781784390150

	References		
1	Gilbert Strang, "Introduction to linear algebra", Wellesley-Cambridge Press, 5 th Edition, August 2016		
	Useful Links		
1	https://docs.python.org		
2	https://www.docs.rstudio.com		
3	https://www.overleaf.com		

CO-PO Mapping						
		Programme Outcomes (PO)				
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3			3		
CO2						
CO3	1	2	2			1

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 13 Marks Submission at the end of Week 13	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2023-24

	Course Information
Programme	M. Tech. (CS and IT)

Class, Semester First Year M. Tech., Sem II

Course Code 7IT545

Course Name Pre-dissertation Work / Seminar

Desired Requisites:

Teaching Scheme		Examination Scheme (Marks)			
Practical	4 Hrs/ Week	LA1	LA2	Lab ESE	Tot al
Interaction	-	30	30	40	100
		Credits: 2			

Course Objectives

- 1 To Review and increase students' understanding of the specific topics.
 - 2 To induce Learning management of values.
 - To teach how research papers are written and read such papers critically and efficiently and to summarize and review them to gain an understanding of a new field, in the absence of a textbook.
 - To teach how to judge the value of different contributions and identify promising new directions in specified area.

Course Outcomes (CO) with Bloom's Taxonomy

At the end of the course, the students will be able to,

СО	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Apply the existing knowledge on real life problems	III	Applying
CO2	Investigate the selected topic/ system.	IV	Analysing
CO3	Verify the outcomes of the work have solved the specified problems.	V	Evaluating

List of Experiments / Lab Activities/Topics

Contents:

The pre-dissertation work will start in semester II and should preferably be a problem with research potential and should involve scientific research review, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution. Seminar should be based preferably on the area in which the candidate is interested to undertake the dissertation work. The candidate has to be in regular contact with their guide and the topic of seminar/dissertation must be mutually decided. The examination shall consist of the preparation of report consisting literature review, detailed problem statement, case studies, etc,

according to type of work carried out. The work has to be presented in front of the examiners panel formed by DPGC for evaluation.

	Textbooks		
1	Suitable books based on the contents of the dissertation/seminar topic selected.		
	References		
1	Suitable books based on the contents of the dissertation/seminar topic selected and research		
1	papers		

	from reputed national and international journals and conferences.					
	Useful Links					
1	As per the need of the dissertation/seminar topic.					

CO-PO Mapping								
	Programme Outcomes (PO)							
	1 2 3 4 5 6							
CO1	2	2	1					
CO2	3				1			
CO3		3			2			

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	30
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	30
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	30
Lab ESE	Lab activities,	Lab Course	During Week 13	40
Lau ESE	attendance, journal	Faculty	Marks Submission at the end of Week 13	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

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	e Cod		7IT531	2 2 2 2 1 1 1	O			
	e Nam			ive – 3: Distributed				
Desire	ea Keq	uisites:	Operating Systems	s, Distributed Netwo	ork			
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1				s of distributed oper	ating systems.			
3			ited operating system		:; ;d;id			
3	1011			s, naming, synchron (CO) with Bloom's	ization in distributed	operating	systems	
			Course Outcomes	Level	1 axonomy			
At the	end of	the course, the	students will be ab					
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Applications

	Security & Case Study:				
VI	Google FS/BigTable, Introduction of Security in Distributed OS,				
V I	Overview of security techniques, features, Need, Access Control, Security 7				
	Management ,Java RMI, Sun Network File System, Google case study				
	Text Books				
1	Pradeep K. Sinha "Distributed Operating Systems Concepts and Design", Eastern Economy Edition, PHI, 1998.				
2	George Coulouris, Jean Dollimore, Tim Kindberg "Distributed Systems: Concepts and Design", Fifth Edition, Pearson, 2012.				
	D 0				
	Reference				
	s .				
1	Sunita Mahajan & Seema Shah, "Distributed Computing", Second Edition, OXFORD, 2013				
	Useful				
	Links				
1	https://nptel.ac.in/courses/106/106/106106107/				
2	https://nptel.ac.in/courses/106/106106168/				

CO-PO Mapping								
	Programme Outcomes							
	DO1	DO2	DO2	(PO)	DO5	DO.		
201	PO1	PO2	PO3	PO4	PO5	PO6		
CO1	1		3			2		
CO2		1 2						
CO3	2		1					

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

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	Scanning and Parsing:						
	Programming Language Grammars, Classification of Grammar, Ambiguity in Grammatic Specification, Scanning, Parsing, Top Down Parsing, Bottom up Parsing, Language Processor Development Tools, LEX, YACC, Compilers: Causes of Large Semantic Gap, Binding and Binding Times, Data Structure used in Compiling, Scope Rules, Memory Allocation, Compilation of Expression, Compilation of Control Structure, Code Optimization						
	Interpreters & Debuggers:						
•	VI Benefits of Interpretation, Overview of Interpretation, The Java Language Environment, Java Virtual Machine, Types of Errors, Debugging Procedures, Classification of Debuggers, Dynamic/Interactive Debugger						
	Text Books						
1	D M Dhamdhere, "System Programming", McGraw Hill Publication, second revised edition	, 2009					
2	Srimanta Pal, "System Programming", Oxford University Press, 2011						
3	R.K. Maurya & A. Godbole, "System Programming and Compiler Construction", Dreamtec Press, 2014	h					
	References						
1	Leland L. Beck, "System Software – An Introduction to Systems Programming", Pearson						
1	Education Asia,3 rd edition, 2000						
2	Santanu Chattopadhyay, "System Software", Prentice-Hall India, 2007						
3	R K Maurya and Anand A Godbole "System Programming and Compiler Construction (Incl	udes					
	Labs)", Dreamtech Press, 2014	nues					
	, ',						
	Useful Links						

CO-PO Mapping								
	Programme Outcomes (PO)							
	PO1	PO2	PO3	PO4	PO5	PO6		
CO1	2		3					
CO2	1	2		1				
CO3			1			1		

The assessment is based on MSE, ISE and ESE.

www.cs.jhu.edu/~scott/pl/lectures/parsing.html

www.en.wikipedia.org/wiki/System_programming https://nptel.ac.in/courses/106/106/106106197/

MSE shall be typically on modules 1 to 3.

2

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

			Walahand Call	laga of Engineering	Congli	
				lege of Engineering Aided Autonomous In		
				AY 2023-24		
			Cou	rse Information		
Progra	amme		M. Tech. (CS and	IT)		
Class,	Semes	ter	First Year M. Tec	h., Sem II		
Cours	e Code	9	7IT533			
Cours			Professional Elec	tive - 3: Mathematic	s for Machine Learning	
Desire	d Req	uisites:	Mathematics			
Te	achin	g Scheme		Examination S	Scheme (Marks)	
Lectur		3 Hrs/week	MSE	ISE	ESE	Total
Tutori		-	30	20	50	100
Practi		_				
Intera		-		Cree	dits: 3	
		1	1			
				urse Objectives		
1			a and calculus for 1			
2			theory for machine			
3	Тос			ity for real application		
				O) with Bloom's Ta	xonomy Level	
			e students will be al			Apply
CO1		pply the concepts of linear algebra and calculus for machine learning algorithms				
CO2		•		nsionality reduction		Analyse
CO3	Evalı	ate the optimi	zation & probabilis	tic algorithms		Evaluate
Modu	ıle		Mo	dule Contents		Hours
	L	inear Algebra	Basics:			
I		ector spaces au indamental sub		and dimensions, line	ear transformation, four	6
		Iatrix Theory				
	N	•		nd eigenvectors, Sp	pecial Matrices and their	
II		orms and spa	ces, eigenvalues a		pecial Matrices and their ons. SVD: Properties and	
II	p:	forms and spa roperties, least	ces, eigenvalues a squared and minim		ons. SVD: Properties and	
II	p:	forms and spa roperties, least	ces, eigenvalues a squared and minim	mum normed solution	ons. SVD: Properties and	
II	p: aj	forms and spa roperties, least oplications, love ecomposition	ces, eigenvalues a squared and minim	mum normed solutions, Gram Schmidt p	ons. SVD: Properties and	
III	praj de D	forms and spa roperties, least oplications, lov ecomposition dimensions Recomposition	ces, eigenvalues a squared and minimal vank approximation duction Algorithm onent analysis, linear	mum normed solutions, Gram Schmidt pas:	ons. SVD: Properties and	
	p aj d D P	forms and sparoperties, least oplications, low ecomposition timensions Recrincipal compo	ces, eigenvalues a squared and minimal vank approximation duction Algorithm onent analysis, linear	mum normed solutions, Gram Schmidt pas:	ons. SVD: Properties and process, polar	7
	p aj d D P an	forms and spa roperties, least oplications, love ecomposition fimensions Re- rincipal compo- nd Jordan cano falculus:	ces, eigenvalues a squared and minit v rank approximation duction Algorithm onent analysis, lineanical form.	mum normed solutions, Gram Schmidt pas: ur discriminant analy	ons. SVD: Properties and process, polar sis, minimal polynomial	7
III	p. aj d. D P au	forms and sparoperties, least oplications, low ecomposition imensions Remains and Jordan canodalculus:	ces, eigenvalues a squared and mining vank approximation duction Algorithm onent analysis, lineanical form.	mum normed solutions, Gram Schmidt pas: ur discriminant analy	ons. SVD: Properties and process, polar sis, minimal polynomial directional derivatives,	6
III	praj de D P au C C B Ja	forms and sparoperties, least oplications, low ecomposition imensions Remains and Jordan canodalculus:	ces, eigenvalues a squared and mining vank approximation duction Algorithm onent analysis, lineanical form.	mum normed solutions, Gram Schmidt pas: ur discriminant analy derivatives, gradient	ons. SVD: Properties and process, polar sis, minimal polynomial directional derivatives,	6
III	praj dd DD P au CC BB Jaa	forms and sparoperties, least oplications, low ecomposition imensions Regard Jordan canodalculus: asic concepts of acobian, hessia optimization:	ces, eigenvalues a squared and mining rank approximation of the analysis, linear analysis,	mum normed solutions, Gram Schmidt pas: ar discriminant analy derivatives, gradient, vex functions and its	ons. SVD: Properties and process, polar sis, minimal polynomial directional derivatives,	6
III	production of the production o	forms and sparoperties, least oplications, low ecomposition imensions Recrincipal compond Jordan cano dalculus: asic concepts of acobian, hessia optimization: finconstrained as or constrained as	ces, eigenvalues a squared and mining vank approximation of the analysis, linear analysis,	mum normed solutions, Gram Schmidt poss, Gram Schmidt poss. Is: It discriminant analytic derivatives, gradient, vex functions and its imization, Numerical optimization: Newton	ons. SVD: Properties and process, polar sis, minimal polynomial directional derivatives, sproperties. di optimization techniques n's method, Steepest	6
III	production of the production o	forms and sparoperties, least oplications, low ecomposition imensions Recrincipal compond Jordan cano dalculus: asic concepts of acobian, hessia optimization: finconstrained as or constrained as	ces, eigenvalues a squared and mining vank approximation of the analysis, linear analysis,	mum normed solutions, Gram Schmidt pas: ur discriminant analy derivatives, gradient, vex functions and its imization, Numerica	ons. SVD: Properties and process, polar sis, minimal polynomial directional derivatives, sproperties. di optimization techniques n's method, Steepest	6
III	production of the production o	forms and sparoperties, least opplications, low ecomposition limensions Recrincipal composition described assistances as concepts of a cobian, hessiances of constrained a constrained a cescent method,	ces, eigenvalues a squared and mining vank approximation of the analysis, linear anical form. of calculus: partial of the convex sets, contained option of the convex sets of the conve	mum normed solutions, Gram Schmidt poss, Gram Schmidt poss. Is: It discriminant analytic derivatives, gradient, vex functions and its imization, Numerical optimization: Newton	ons. SVD: Properties and process, polar sis, minimal polynomial directional derivatives, a properties. al optimization techniques nusue method, Steepest to SVM, Error	6
III	pray de DD P au CC B B Ja CC	forms and sparoperties, least opplications, low ecomposition limensions Recrincipal composition described assistances as concepts of a cobian, hessiances of constrained a constrained a cescent method,	ces, eigenvalues a squared and mining vank approximation of the analysis, linear anical form. of calculus: partial of the convex sets, contained option of the convex sets of the conve	mum normed solutions, Gram Schmidt pass: ar discriminant analyderivatives, gradient, vex functions and its imization, Numerical optimization: Newtonethod. Introduction	ons. SVD: Properties and process, polar sis, minimal polynomial directional derivatives, a properties. al optimization techniques nusue method, Steepest to SVM, Error	6
III IV V	production of the production o	forms and sparoperties, least opplications, low ecomposition imensions Recomposition dimensions Recomposition discontinuity. In constrained a concept of constrained a co	ces, eigenvalues a squared and mining vank approximation of the analysis, linear anical form. of calculus: partial of the analysis of calculus: partial of the analysis of calculus: partial of the analysis of probability:	mum normed solutions, Gram Schmidt poss, Gram Schmidt poss; are discriminant analy derivatives, gradient, vex functions and its imization, Numerica optimization: Newtonethod. Introductionary, hard and soft marconditional probab	ons. SVD: Properties and process, polar sis, minimal polynomial directional derivatives, sproperties. di optimization techniques n's method, Steepest to SVM, Error gin classifiers. ility, Bayes" theorem,	6 6 7
III	production of the production o	roperties, least oplications, low ecomposition of the principal composition of the principal composition of the principal composition of the principal composition of the principal concepts of the principal constrained and the principal concepts of the principal constrained concepts of the principal concepts of the principal constrained concepts of the principal concepts of the principal constrained concepts of the principal concepts of the principal constrained cons	ces, eigenvalues a squared and minimal variated and minimal variated and minimal variated and analysis, linear analysis, convex sets, confined constrained of Penalty function in the concepts of duality analysis analysis and linear analysis	mum normed solutions, Gram Schmidt poss, Gram Schmidt poss; as: ar discriminant analy derivatives, gradient, vex functions and its imization, Numerical optimization: Newton the derivation in the derivative	ons. SVD: Properties and process, polar sis, minimal polynomial directional derivatives, sproperties. di optimization techniques in smethod, Steepest to SVM, Error gin classifiers. ility, Bayes theorem, and variance, few	6

	Text Books					
1	W. Cheney, "Analysis for Applied Mathematics", New York: Springer Science+Business Medias, 2001.					
2	S. Axler, "Linear Algebra Done Right", Springer International Publishing, 3 rd edition, 2015					
	References					
1	All Modules taken from below link course. https://onlinecourses.nptel.ac.in/noc21_ma38/					
	Useful Links					
1	https://nptel.ac.in/courses/111/107/111107137/					

CO-PO Mapping								
		Programme Outcomes (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6		
CO1	2			2				
CO2		3	3		2			
CO3	1			1				

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		Wa	Ichand College	of Engineering				
				2020-21	- /			
			Course 1	Information				
Programme M.Tech. (CS and IT)								
Class,	Semester	•	First Year M. Tech.,	, Sem II				
Course	e Code		7IT 534					
Course	e Name		Professional Electiv	e – 3-Soft Computir	ng and applications			
Desire	d Requis	ites:	Basic knowledge of	mathematics				
	eaching			Examination Scl	, ,			
Lectur	re	3 Hrs/week	MSE	ISE	ESE	Total		
Tutori		-	30	20	50	100		
Practi		-						
Intera	ction	-		Credit	s: 3			
-				Objectives				
1					solutions for real-worl			
2	_	_	or non-traditional tech genetic algorithms	nologies and fundar	mentals of artificial ne	urai networks,		
4	Tuzzy se	is, fuzzy logic,	genetic argoritims					
3	To discu	ıss hybrid appl	ications of ANN, Fuz	zy and GA				
001	1		se Outcomes (CO) w		•	A1		
CO1	_		ng techniques and thei			Analyze Evaluate		
CO2	proble		nd neural networks te	echniques to solve va	arious engineering	Evaluate		
CO3	-		lications using genetic algorithms and hybrid approaches			Create		
	ouna p	rototyping upp	meanons asing general	o argorithmis and rij	oria approactics			
Modu	le		Module	Contents		Hours		
	Int	roduction: Evo	olution of Computing	Soft Computing Co	onstituents, From			
	Con	nventional AI to	o Computational Intel	ligence, Characteris	tics of Neuro			
I	Coı	nputing and So	oft Computing, Differen	ence between Hard	Computing and	6		
	Sof	t Computing, C	Concepts of Learning	and Adaptation				
	Tr	my Logica E	au Sata Opanations	a Euggy Cota Eve	Palations			
	I		zy Sets, Operations on tions: Fuzzy Rules an	•				
II		-	kpert Systems, Fuzzy	•	ruzzy interence	7		
	- Bys	tems, i dzzy Lz	tpert bystems, r uzzy	Decision waking				
	Nei	ıral Networks	: Machine Learning U	Jsing Neural Netwo	rk, Adaptive			
	I		rward Networks, Sup	~				
III	I		tion Networks : Reinf		-	7		
		-	letworks, Adaptive Ro	esonance Architectu	res, Advances in			
	Nei	ıral Networks						
	Car	natio Algorith	ms: Introduction to G	anatic Algorithms (GA) Applications of			
** *	I	_	earning: Machine Lea	-		_		
IV	I	quisition	Iviaciniic Det	ipprouch to		7		

V	Hybrid Systems: Introduction to Hybrid Systems, Adaptive Neuro Fuzzy Inference System(ANFIS)								
VI	Deep Learning: Spark auto encoder, Convolutional neural networks, Recurrent neural networks, Deep belief networks								
				Text Book					
1		ran S., Vijayala ms", PHI, 2003	kshmi Pai C	3.A., "Neur	al Networks, Fuzz	y Logic and G	enetic		
2	Ian Good	lfellow, Yoshua	Bengio, Aa	ıron Courvi	lle, "Deep Learnin	g", MIT Press	s e-book		
3					•				
4									
				Reference	es				
1	Jyh-Shin PHI, 200		huen-Tsai S	Sun, Eiji Mi	zutani, "Neuro-Fu	zzy and Soft (Computing",		
2	George J	. Klir and Bo Y	uan, "Fuzzy	Sets and F	uzzy Logic: Theor	y and Applica	tions", PHI, 1995		
3									
4									
	1								
				Useful Lin	ks				
				O-PO Map					
				nme Outco					
		1	2	3	4	5	6		
CO	D1	2			3				
CO)2			2	2		2		
CO	D3	2		2	2		2		
The stren	ngth of ma	pping is to be v	vritten as 1	,2,3; Here,	1: Low, 2: Mediu	ım, 3: High			

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE. MSE shall

be typically on modules 1 to 3.

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	(Government Aided Autonomous Institute) AY 2023-24								
				Information					
Progra	mme		M. Tech. (CS and I						
Class, S		her	First Year M. Tech.	·					
Course			7IT535	, belli II					
Course				e - 4: Big Data Com	nuting				
		isites:	Data Mining	C 4. Dig Duta Com	iputing				
	a requ		Dutu Willing						
To	eachin	g Scheme		Examination Sch	neme (Marks)				
Lectur		3 Hrs/week	MSE	ISE	ESE	Total			
Cutoria		-	30	20	50	100			
Practic		_				100			
nterac		_		Credit	s: 3				
		l							
			Course	Objectives					
1			amental concepts of b						
2	To ar	nalyze the big dat	ta using various techn	iques					
3	To re		using visualization to						
		Cour	rse Outcomes (CO) w	ith Bloom's Taxon	omy Level				
At the e	end of	the course, the st	udents will be able to	,					
CO1	Elabo	orate the fundame	entals of various big o	lata analytics technic	ques	Apply			
CO2	Study	the various app	roach to implement d	istributed environme	ent	Analyze			
CO3	Evalı	ate the performa	ance of algorithms on	advanced distributed	d system	Evaluate			
Modu	1.		Modul	o Comtomto		Hamma			
Modu		-tuo du oti on to T		e Contents		Hours			
I		ntroduction to E		of Rig Data Drivers	for Rig Data	6			
1		•	nportance, Four V's of Big Data, Drivers for Big Data – g Data Analytics, Big Data Analytics applications.						
	_		· · · · ·	Data Maryties app	neations.				
		Big Data Technologies: Hadoop"s Parallel World, Data discovery, Open source technology for Big Data							
II		Analytics, Cloud and Big Data, Predictive Analytics, Mobile Business Intelligence							
		and Big Data, Crowd Sourcing Analytics, Inter- and Trans-Firewall Analytics							
				,					
Processing Big Data:									
		Detecting Patterns in Complex Data with Clustering and Link Analysis, Identifying previously unknown groupings within a data set, Segmenting the							
111		customer market with the K–Means algorithm, Defining similarity with							
III	C		<u> </u>		•				
III	ci aj	ppropriate distan	ce measures, Constru	cting tree-like cluste	ers with hierarchical				
III	ci aj	ppropriate distan lustering, Cluster	ce measures, Construring text documents a	cting tree-like cluste	ers with hierarchical				
	ci aj ci	ppropriate distan lustering, Cluster ladoop Mapred	ce measures, Construring text documents au	cting tree—like clustend tweets to aid under	ers with hierarchical erstanding	6			
III	ci aj ci H Ir	ppropriate distan lustering, Cluster ladoop Mapred atroduction to Ma	ce measures, Construring text documents and uce: ap-Reduce, Hadoop F	cting tree—like clustend tweets to aid under	ers with hierarchical erstanding	6			
IV	ci aj cl H Ir	ppropriate distan lustering, Cluster ladoop Mapred ntroduction to Ma pistributed Map	ce measures, Construring text documents as uce: ap-Reduce, Hadoop F Reduce:	cting tree—like cluste nd tweets to aid under ramework, Spark Fr	ers with hierarchical erstanding	6			
	ci aj ci H In D	ppropriate distan lustering, Cluster ladoop Mapred atroduction to Map listributed Map F-IDF Example,	ce measures, Construring text documents as uce: ap-Reduce, Hadoop F Reduce:	cting tree—like cluste nd tweets to aid under ramework, Spark Fr	ers with hierarchical erstanding	6			
IV	ci aj ci H Ir D T	ppropriate distan lustering, Cluster ladoop Mapred atroduction to Map listributed Map F-IDF Example, park	ce measures, Construring text documents as uce: ap-Reduce, Hadoop F Reduce:	cting tree—like cluste nd tweets to aid under ramework, Spark Fr	ers with hierarchical erstanding				
IV V	ci aj ci H In T S	ppropriate distan lustering, Cluster ladoop Mapred atroduction to Map listributed Map F-IDF Example, park nalytic Tools:	ce measures, Construring text documents and uce: ap-Reduce, Hadoop F Reduce: Page Rank Example,	cting tree—like cluste nd tweets to aid under Framework, Spark Fr Demonstration: Pag	ers with hierarchical erstanding ramework ge Rank Algorithm in				
IV	cri and cri	ppropriate distandustering, Cluster adoop Mapredutroduction to Mistributed MapreduF-IDF Example, park analytic Tools:	ce measures, Construring text documents and uce: ap-Reduce, Hadoop F Reduce: Page Rank Example, OL vs. PIG, PIG Latin	cting tree—like clusted and tweets to aid under the cramework, Spark Framework, Spark Framework (Spark Framework), User Defined Function:	ers with hierarchical erstanding ramework ge Rank Algorithm in tions, Data Processing				
IV V	cri and cri	ppropriate distandustering, Cluster adoop Mapredutroduction to Mistributed MapreduF-IDF Example, park analytic Tools:	ce measures, Construring text documents and uce: ap-Reduce, Hadoop F Reduce: Page Rank Example,	cting tree—like clusted and tweets to aid under the cramework, Spark Framework, Spark Framework (Spark Framework), User Defined Function:	ers with hierarchical erstanding ramework ge Rank Algorithm in tions, Data Processing	6			
IV V	cri and cri	ppropriate distandustering, Cluster adoop Mapredutroduction to Mistributed MapreduF-IDF Example, park analytic Tools:	ce measures, Constructing text documents as uce: ap-Reduce, Hadoop F Reduce: Page Rank Example, OL vs. PIG, PIG Latin ew of Hive, Hive QL	cting tree—like clusted and tweets to aid under tramework, Spark From Demonstration: Page 4, User Defined Funces, Tables, Querying E	ers with hierarchical erstanding ramework ge Rank Algorithm in tions, Data Processing	6			
IV V VI	and color of the c	ppropriate distan lustering, Cluster ladoop Mapred atroduction to Map bistributed Map F-IDF Example, park analytic Tools: IG overview, SQ pperators, Overvi	ce measures, Constructing text documents as uce: ap-Reduce, Hadoop For Reduce: Page Rank Example, OL vs. PIG, PIG Latin ew of Hive, Hive QL	cting tree—like clusted and tweets to aid under tramework, Spark From Demonstration: Page, User Defined Funce, Tables, Querying Ext Books	ers with hierarchical erstanding ramework ge Rank Algorithm in tions, Data Processing Data	7			
IV V	cri and cri	ppropriate distantustering, Cluster adoop Mapred atroduction to Mapred atroduction at the control a	ce measures, Constructing text documents at uce: ap-Reduce, Hadoop For Reduce: Page Rank Example, OL vs. PIG, PIG Latin ew of Hive, Hive QL Tex Rig Data Analytics with	cting tree—like clusted and tweets to aid under the transfer of the cluster of the transfer of the cluster of t	ers with hierarchical erstanding ramework ge Rank Algorithm in tions, Data Processing	6 7 on, 2013			

	References
1	Franks Bill, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley and SAS Business Series,1st Edition, 2012

Useful Links

Module I, II, III, IV, V, VI

https://nptel.ac.in/courses/106/104/106104189/

	CO-PO Mapping										
	Programme Outcomes (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6					
CO1	1		1								
CO2		1		2							
CO3	3		2		1						

Assessment

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			,	ided Autonomous Ir AY 2023-24	isitiute)		
				rse Information			
Progra	amme		M. Tech. (CS and				
Class, Semester First Year M. Tech., Sem II							
	e Code		7IT536	,			
	e Nam			ive - 4: High Perfor	mance Computing		
		uisites:	Operating System				
	1		- F				
Te	eaching	g Scheme		Examination	Scheme (Marks)		
Lectur		3 Hrs/week	MSE	ISE		Total	
Tutori	al	-	30	20	50	100	
Practi	cal	-					
ntera	ction	-		Cre	dits: 3		
			1				
			Cou	ırse Objectives			
1	To el	aborate the con			Formance computing		
2				programs with sequ			
3	То со	mpare multi-co	ore and many-core a	rchitectures			
)) with Bloom's Ta	axonomy Level		
			students will be abl				
CO1				solving the problem		Apply	
CO2				thms for performan	*	Analyze	
CO3	Desig	n the appropria	ite parallel algorithm	n for the given prob	olem.	Create	
Modu	1.		Ma	dule Contents		Hours	
viouu		agia Danallal A		uule Contents		nours	
I		Basic Parallel Algorithm Introduction to Parallel Computing, Parallelism on the JVM, Running					
1					ate Pi, First-Class Tasks	6	
			arallel Algorithms	20 11201100 00 200111			
II			_	d Parallel Mapping,	Parallel Fold (Reduce)	7	
				an (Prefix Sum) Ope			
			•	gramming, Data-Par	allel Operations, Scala		
III		arallel Collection				7	
		plitters and Con					
13.7			for Parallel Comp	0	Can Canadasa Data	7	
IV					tion, Conc-tree Data Conc-Tree Combiners	/	
		orting	ized, Constant-time	Append Operation,	Conc-free Combiners		
V			twork, Bubble sort			6	
		raph Algorith					
VI		ST, SSSP, APS				6	
		·					
				Text Books			
1			Gupta, George Kararson Education, 20		"Introduction to parallel co	omputing,	
				References			
					omputer Science, W. H. Free		

	Useful Links							
ſ		Module I, II, III, IV						
	1	https://www.coursera.org/learn/parprog1?ranMID=40328&ranEAID=*GqSdLGGurk&ranSiteID						
	1	=.GqSdLGGurk-ntwHfWI_xX32aIgZXdr9Ug&siteID=.GqSdLGGurk-						
		ntwHfWI_xX32aIgZXdr9Ug&utm_content=10&utm_medium=partners&utm_source=linkshare&						
		utm_campaign=*GqSdLGGurk#syllabus						

CO-PO Mapping									
	Programme Outcomes (PO)								
	PO1	PO2	PO3	PO4	PO5	PO6			
CO1		1		1					
CO2	2		2		1				
CO3		2		3					

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	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
	AY 2023-24									
	Course Information									
Progra	Programme M. Tech. (CS and IT)									
	Class, Semester First Year M. Tech., Sem II									
Cours	e Cod	e	7IT537							
Cours	e Nan	1e	Professional Elect	ive - 4: Deep Learni	ng					
Desire	ed Req	uisites:			-					
Te	eachin	g Scheme		Examination S	Scheme (Marks)					
Lectur	re	3 Hrs/week	MSE	ISE	ESE		Total			
Tutori	ial	-	30	20	50		100			
Practi	cal	-								
Intera	ction	-		Cree	dits: 3					
			Cou	ırse Objectives						
1	To e	laborate the mod	lels of Deep Learnin	ng						
2				arning with perform	ance parameters					
3	To ii	nterpret the prob	lem to solve using I	Deep Learning						
)) with Bloom's Ta	xonomy Level					
			students will be abl		··		A 1			
CO1				ng for suitable applie			Apply			
CO2				ertaining to Deep Le			Analyze			
CO3	Bull	u and compare v	arious Deep Learni	ng model for solving	g real world applicatio	n	Create			
Modu	مار		Mod	lule Contents			Hours			
MIOUU		indamentals o	f Neural Networks				Hours			
I	N A S R	AcCulloch Pitts Algorithm, Multigmoid Neuro	Neuron, Threshold filayer Perceptrons ons, Gradient D	ling Logic, Perceptr		LPs,	7			
II		Gradient Descent		Based GD, Nestero			6			
III	methods, Dropout. Greedy Layer wise Pre-training, Better activation functions,				7					
IV	Representations Of Words: One hot representation of words, SVD for learning									
V	word representation. Convolutional Neural Networks for Computer Vision: Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Fooling Convolutional Neural Networks						6			

	Recurrent Neural Networks:					
VI	Recurrent Neural Network, Back Propagation through time(BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTM.	6				
	and Exproding Gradients, Transacted B111, GRC, ES1141.					
	Text Books					
1	Aurelien Geron, "Hands-On Machine Learning with Scikit-Learn, Keras and Tensor	Flow:				
	Concepts, Tools and Techniques to Build Intelligent Systems", 2nd Edition, O'Reilly,20	19				
2	2 Eugene Charniak, "Introduction to Deep Learning, The MIT Press Cambridge", 1st Edition, 2019					
	References					
1	Ian Goodfellow, Yoshua Bengio and Aoron Courville "Deep Learning", The MIT Pre	SS				
1	Cambridge, Massachusetts London, England, 2017					
	· · · · · · · · · · · · · · · · · · ·					
	Useful Links					
1	All Modules taken from below link					
1	https://www.classcentral.com/course/swayam-deep-learning-iitropar-43579					

CO-PO Mapping										
		Programme Outcomes (PO)								
	PO1	PO2	PO3	PO4	PO5	PO6				
CO1		1			1					
CO2		2		2						
CO3	2		1							

The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

			Walahand Cal	lege of Engineering	Songli						
				Aided Autonomous Ins							
				AY 2023-24							
	Course Information										
Progra	Programme M. Tech. (CS and IT)										
Class,	Semes	ster	First Year M. Tech	ı., Sem II							
Cours	e Code	e	7IT538								
Cours	Course Name Professional Elective - 4: Geographical Information System & Remote Sensing										
			-Interdisciplinary								
Desire	d Req	uisites:	Fundamentals of In	mage processing							
Те	eaching	g Scheme		Examination S	Scheme (Marks)						
Lectu		3 Hrs/week	MSE	ISE	ESE	Total					
Tutori	ial	-	30	20	50	100					
Practi	cal	-									
Intera	ction	-		Cree	dits: 2						
				urse Objectives	(D.C) 1						
1	l		e of the fundamenta	Is of Remote Sensin	g (RS) and geograph	ical information					
2		ms (GIS)	milion with Data and	l Data Products in R	C and CIC						
3				olications of RS and							
4	10 ac	quaint students	s auvantages and app	oncations of KS and	Olb						
7		Co	urse Outcomes (C	O) with Bloom's Ta	vonomy Level						
At the	end of		students will be abl		Adnomy Level						
CO1				concepts in RS and	GIS	Understand					
CO2					te GIS data and GIS	Apply					
CO2	datab	ase manageme	nt system								
CO3				ducts of RS and GIS		Analyse					
CO4	l	•		nd data products to	design solution for	Evaluate					
	vario	us interdiscipli	nary problems								
Modu	ما		Modul	e Contents		Hours					
Modu		oncents and F	oundation of Remo			Hours					
		-	Remote Sensing	U	omagnetic Energy						
	- 1	·		•	gy Interaction in the						
I		-	_		in Remote Sensing						
		road Classifica									
		nd Sensors, Da	5								
		ata and Data P									
		_	Interpretation and	_							
11		_		_	strategies and keys	1					
				-	age Rectification and						
Restoration, Image Enhancement, Spatial Filtering, Image Transforma Image Classification and Analysis.											
			Remote Sensing								
III				rop Inventory, Grou	ind Water Mapping	6					
				g, Disaster Managem							
	G	IS – An Overv	view								
IV					Difference between						
11		Image Processing system and GIS, Various GIS packages and their salient									
	fe	eatures, Essenti	als components of C	IS, Utility of GIS, G	iPS						

GIS Data types and Data Representation, Data Acquisition, Georeferencing of GIS Data, Raster and Vector data, Raster to Vector conversion, Remote Sensing Data in GIS, GIS Database and Database Management System GIS Spatial Data Analysis and Applications Measurements in GIS-Lengths, Perimeters, and Areas, Queries, Reclassification, Buffering and Neighborhood Functions, Map Overlay, Spatial Interpolation, Analysis of Surfaces, Network Analysis, GIS Applications Text Books Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing House. 2008						
VI Reclassification, Buffering and Neighborhood Functions, Map Overlay, Spatial Interpolation, Analysis of Surfaces, Network Analysis, GIS Applications Text Books Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing House. 2008 Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Information System", Prentice Hall India. 20012 References Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 6th Edition. 2012 Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010 Useful Links NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov	V	of GIS Data, Raster and Vector data, Raster to Vector conversion, Remote				
Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing House. 2008 Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Information System", Prentice Hall India. 20012 References Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 6th Edition. 2012 Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010 Useful Links NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov	VI	GIS Spatial Data Analysis and Applications Measurements in GIS-Lengths, Perimeters, and Areas, Queries, Reclassification, Buffering and Neighborhood Functions, Map Overlay, Spatial Interpolation, Analysis of Surfaces, Network Analysis, GIS				
Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing House. 2008 Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Information System", Prentice Hall India. 20012 References Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 6th Edition. 2012 Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010 Useful Links NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov						
Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Information System", Prentice Hall India. 20012 References Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 6th Edition. 2012 Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010 Useful Links NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov						
Prentice Hall India. 20012 References Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 6th Edition. 2012 Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010 Useful Links NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov	1	Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing House. 2008				
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Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 6th Edition. 2012 Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010 Useful Links NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov		D 6				
Edition. 2012 Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010 Useful Links NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov						
Useful Links NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov	1		iley and Sons, 6th			
NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov	2	Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010				
NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 https://www.usgs.gov						
1 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10 2 https://www.usgs.gov		Useful Links				
2 https://www.usgs.gov	1					
1 00	2					
		1 0				

CO-PO Mapping							
	Programme Outcomes (PO)						
	1 2 3 4 5 6						
CO1			2				
CO2			2				
CO3	2			2			
CO4	3			2		2	

The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3.

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ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

Walchand College of Engineering, Sangli						
	(Government Aided Autonomous Institute)					
	AY 2022-23					
	Course Information					
Programme	M. Tech. (CS and IT)					
Class, Semester	First Year M. Tech., Sem II					
Course Code	7OE510					
Course Name Open Elective -: Machine Learning & Applications						
Desired Requisites:	Desired Requisites:					

Teaching Scheme		Examination Scheme (Marks)				
Lecture 3 Hrs/week		MSE	MSE ISE ESE		Total	
Tutorial	-	30	20	50	100	
	-	Credits: 3				

Course Objectives							
1	To explain the concept supervised and unsupervised machine learning techniques.						
2	To introduce various machine learning algorithms.						
3	3 To discuss problem solving approaches using appropriate machine learning techniques.						
	Course Outcomes (CO) with Bloom's Taxonomy Level						

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Compare various machine learning algorithms for Regression and Classification.	IV	Analysing
CO2	Apply appropriate learning algorithm for a problems.	III	Applying
CO3	Evaluate Machine Learning algorithms with performance parameters.	V	Evaluating

Module	Module Contents	Hours
I	Introduction and Regression Analysis Machine Learning concepts, Supervised learning, Unsupervised learning, linear regression in one variable, cost function, gradient descent, linear regression with multiple variables: gradient descent	7
II	Logistic Regression Classification, hypothesis representation, decision boundary, cost function, simplified cost function and gradient descent, optimization, one v/s all	6
III	Artificial Neural Networks: Introduction, Early Models, Perceptron Learning, Backpropagation, Initialization, Training & Validation.	6
IV	Support Vector Machine: Optimization objective, mathematics behind large margin classification, kernels using as SVM	
V	Learning Theory: Regularization, bias/ Variance trade-off, error analysis, ensemble methods, practical advice on how to use learning algorithms, precision/recall trade-off	7
VI	Unsupervised Learning Clustering, k-means, EM, principal component analysis, outliers detection	6

	Text Books				
1	Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, "The Elements of Statistical Learning",				
1	Springer, 2nd Edition, 2009.				
	References				
1	Christopher Bishop, "Pattern Recognition and Machine Learning", Springer, 1st Edition, 2006.				
	Useful Links				
1	https://www.classcentral.com/course/swayam-introduction-to-machine-learning-5288				
2	https://web.stanford.edu/~hastie/Papers/ESLII.pdf				
	http://users.isr.ist.utl.pt/~wurmd/Livros/school/Bishop%20-				
3	%20Pattern%20Recognition%20And%20Machine%20Learning%20-				
	%20Springer%20%202006.pdf				

CO-PO Mapping							
	Programme Outcomes (PO)						
	PO1 PO2 PO3 PO4 PO5 PO6						
CO1			1				
CO2	2	1		2	2		
CO3	3		2				

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

Assessment

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