Lecture Tutorial Practical Interaction	ester le ne quisites: ing Scheme 3 Hrs/week	AY	n., Sem I	eme (Marks)		
Class, Semo Course Coo Course Nan Desired Re Teach Lecture Tutorial Practical Interaction	ester le ne quisites: ing Scheme 3 Hrs/week	Course M.Tech. (CS and First Year M. Tech 6IT501 Advanced Algorith Computer Algorith MSE	e Information IT) h., Sem I hms hms Examination Sch			
Class, Semo Course Coo Course Nan Desired Re Teach Lecture Tutorial Practical Interaction	ester le ne quisites: ing Scheme 3 Hrs/week	M.Tech. (CS and First Year M. Tech 6IT501 Advanced Algorith Computer Algorith MSE	IT) n., Sem I nms nms Examination Sch			
Class, Semo Course Coo Course Nan Desired Re Teach Lecture Tutorial Practical Interaction	ester le ne quisites: ing Scheme 3 Hrs/week	First Year M. Tech 6IT501 Advanced Algorith Computer Algorith MSE	n., Sem I nms nms Examination Sch			
Course Coo Course Nan Desired Re Teach Lecture Tutorial Practical Interaction	le me quisites: ing Scheme 3 Hrs/week	6IT501 Advanced Algorith Computer Algorith MSE	nms nms Examination Sch			
Desired Rev Teach Lecture Tutorial Practical Interaction	quisites:       ing Scheme       3 Hrs/week       -       -       -       -	Computer Algorith	Examination Sch			
Teach Lecture Tutorial Practical Interaction	ing Scheme 3 Hrs/week	MSE	Examination Sch			
Lecture Tutorial Practical Interaction	3 Hrs/week - -					
Lecture Tutorial Practical Interaction	3 Hrs/week - -					
Tutorial Practical Interaction	- -		ISE		<b>T 4 1</b>	
Practical Interaction	-	30		ESE	Total	
Interaction	-		20	50	100	
			Credits	<b></b> 2		
1 To	-			). J		
1 To		Cours	e Objectives			
	exercise the Graph					
	classify shortest pa	e	niques			
			formance and complex	xities		
		. ,	with Bloom's Taxon	omy Level		
	of the course, the stu					
	lve graph related al	-	<u> </u>		Apply	
		· · ·	stance based scenario		Analyze	
CO3 Ve	rify the solution for	engineering proble	em using graph algori	Ithm	Create	
Module		Mod	ule Contents		Hours	
	<b>Elementary Grap</b>	oh Algorithms and	I MST: Representation	on of Graphs, BFS and		
Ι		opological Sort, Strongly Connected Components Growing a Minimum				
	<u> </u>	Algorithms of Kruskal and Prim nortest Path Algorithms: Bellman-Ford Algorithm, SSSP in				
т					C	
II		ofs of Shortest-pat	Algorithm, Difference	e Constraints and	6	
				Multiplication Floyd-		
III		<b>thm,</b> Johnson's Algorithm for Sparse Graphs Flow Networks, 7				
	U	Method, Maximum Bipartite Matching, Push-relable algorithms				
			· · ·	Dynamic Multithreading		
IV				iltithreaded merge sort	6	
± •			Inverting matrices, Sy	mmetric positive-		
		ind least-squares ap	<u>.</u>	ND commission 1		
V	NP-Completeness reducibility NPco		me verification, I NP-complete problem	NP-completeness and	7	
	-				/	
	<b>Approximation Algorithms:</b> The vertex-cover problem, The traveling-salesmanVIproblem, The set-covering problem, Randomization and linear programming, The					
VI		covering problem. I	Randomization and lip	near programming. The	6	

Text Books								
1		Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms",						
1	Third Edition the MIT Press Cambridge, London, England							
	References							
1	Horrowitz, Sahni Rajasekaran, "Computer Algorithms", Computer Science, W. H. Freeman and							
1	company	y Press, New yo	ork					
	Useful Links							
1	To be de	clared during th	ne course on the	CMS.				
2								
			CO-	PO Mapping				
			Programm	ne Outcomes	( <b>PO</b> )			
		PO1	PO2	PO3	PO4	PO5	PO6	
С	01	2						
С	02		3		2	1		
С	03	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.

Assessmer	Assessment Plan based on Bloom's Taxonomy Level							
<b>Bloom's Taxonomy Level</b>	MSE	ISE	ESE	Total				
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Apply	10	10	20	40				
Analyze	10	5	10	25				
Evaluate	10	5	10	25				
Create			10	10				
Total	30	20	50	100				

				lege of Engineerin			
				Aided Autonomous 1 AY 2022-23	nstitute)		
				AY 2022-23 Irse Information			
Progra	mmo		M.Tech. (CS an				
Class,		stor	First Year M. To	,			
Course			6IT502	cent, sent i			
Course			Unix Internal				
		uisites:	Operating Syste	m			
DUSILU	u Kcy	uisites.	Operating Syste	111			
Те	achin	g Scheme		Examination	Scheme (Marks)		
Lecture 3 Hrs/week			MSE	ISE	ESE	Tota	ıl
Tutori	al	_	30	20	50	100	)
Practic		-					
Interac	ction	-		Cre	edits: 3		
		1	1				
			Ca	urse Objectives			
1	Toir	ternret design		nilosophy of the U	nix/Linux OS		
2			rchitecture of Uni				
<u>2</u> 3				A/LIIIUX OS.			
3	10 u		of Linux/Unix.	O) with Bloom's T	avanamy I aval		
At the	end of		e students will be al				
CO1				hy of the Unix/Linu		An	ply
CO2			cture of Unix/Linux				lyze
CO3		pare various IP					lyze
		<u> </u>					
Modu	le		Μ	Iodule Contents			Hours
Introduction to Unix Internals						Hours	
			Unix Internals				
Ι	G	eneral Overvie	Unix Internals w of the System - 1	History, System Str	ucture, User Perspec	etive,	7
Ι	G O	eneral Overvie perating System	Unix Internals w of the System - I m Services, Assum			tive,	
Ι	G O In	eneral Overvie perating System <b>atroduction to</b>	Unix Internals w of the System - I m Services, Assum the Kernel	History, System Str ption About Hardw	are.		
I	G O In A	eneral Overvie perating System ntroduction to rchitecture of U	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc	History, System Str ption About Hardw	are.	ructure,	
	G O In A S	eneral Overvie perating System <b>ntroduction to</b> rchitecture of U ystem Adminis	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intro	are.	ructure,	7
	G O In A S K	eneral Overvie perating System <b>ntroduction to</b> rchitecture of U ystem Adminis ernel Data Stru	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intro	are.	ructure,	7
П	G O Iu A S: K Iu	eneral Overvie perating System <b>ntroduction to</b> architecture of U ystem Adminis ernel Data Stru- nternal Repres	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intro ninistration	are. epts, Kernel Data St oduction to system c	ructure, oncepts,	7
	G O In A S S K K In In	eneral Overvie perating System <b>ntroduction to</b> rchitecture of U ystem Adminis ernel Data Stru- <b>nternal Repres</b> nodes, structure	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files e of the regular file,	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intro ninistration directories, conver	are. epts, Kernel Data Stoduction to system c sion of a pathname t	ructure, oncepts, o inode,	7
П	G O In A S K K In In s	eneral Overvie perating System <b>ntroduction to</b> rchitecture of U ystem Adminis ernel Data Stru- <b>nternal Repres</b> nodes, structure	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files e of the regular file,	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intro ninistration directories, conver	are. epts, Kernel Data St oduction to system c	ructure, oncepts, o inode,	7
II	G O In A Sy K K In In su ty S	eneral Overvie perating System <b>ntroduction to</b> architecture of U ystem Adminis cernel Data Stru- <b>nternal Repres</b> nodes, structure aper block, inou- ypes. <b>tructure of Pr</b>	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a ocess	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intro ninistration directories, conver new file, allocation	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, othe	o inode, r file	7 6 7
П	G O In A S K K In In In su ty S S P	eneral Overvie perating System <b>ntroduction to</b> rchitecture of U ystem Adminis ernel Data Stru- <b>nternal Repres</b> nodes, structure uper block, inou- pes. <b>tructure of Pr</b> - rocess stages an	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files e of the regular file, de assignment to a occess nd transitions, layo	History, System Str ption About Hardw etion to system conc e of UNIX OS, Intr- ninistration directories, conver new file, allocation ut of system memor	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other ry, the context of a P	o inode,	7
II	G O In A S K K In In su ty S Y Pi sz	eneral Overvie perating System <b>ntroduction to</b> rchitecture of U ystem Adminis ernel Data Stru- nternal Represent nodes, structure uper block, inou- ypes. tructure of Pr- rocess stages an aving context o	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduce stration Architectur acture, System Adm sentation of Files e of the regular file, de assignment to a ocess nd transitions, layo f a process, manipu	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intro ninistration directories, conver new file, allocation	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other ry, the context of a P	o inode,	7 6 7
II	G O In A S S K K In In su su ty S P I S S P	eneral Overvie perating System <b>ntroduction to</b> architecture of U ystem Adminis ernel Data Stru- <b>nternal Repres</b> nodes, structure uper block, inou- pes. <b>tructure of Pr</b> rocess stages an aving context of <b>rocess Contro</b>	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduce stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a occess nd transitions, layo f a process, manipu I	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intro- ninistration directories, conver new file, allocation ut of system memori ilation of the proces	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other ry, the context of a P as address space.	o inode, r file	7 6 7
II	G O In A S S K K In In su ty S P P S 2 P P P	eneral Overvie perating System <b>ntroduction to</b> architecture of U ystem Adminis icernel Data Stru- <b>nternal Repres</b> nodes, structure uper block, inou- ypes. <b>tructure of Pr</b> rocess stages an aving context of <b>rocess Contro</b> rocess creation	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a occess nd transitions, layo f a process, manipu I , signals, process te	History, System Str ption About Hardw etion to system conc e of UNIX OS, Intro ninistration directories, conver new file, allocation ut of system memor alation of the process ermination, awaiting	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other ry, the context of a P address space. g process termination	o inode, r file process,	7 6 7
II III IV	G O In A Sy K In In su ty Sy Py sz Pr sz Pr in	eneral Overvie perating System <b>ntroduction to</b> architecture of U ystem Adminis ernel Data Stru- <b>nternal Repres</b> nodes, structure aper block, inou- ypes. <b>tructure of Pr</b> rocess stages an aving context o <b>rocess Contro</b> rocess creation avoking other p	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a occess nd transitions, layo f a process, manipu I , signals, process te rograms, the user i	History, System Str ption About Hardw etion to system conc e of UNIX OS, Intr- ninistration directories, conver new file, allocation ut of system memor lation of the process ermination, awaiting d of a process, the s	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other ry, the context of a P as address space. g process termination hell, system Boot ar	o inode, r file process,	7 6 7 7
II III IV	G O In A S S K In In su ty S P P S S P P I sz P P I in p	eneral Overvie perating System <b>ntroduction to</b> rchitecture of U ystem Adminis ernel Data Stru- <b>nternal Repres</b> nodes, structure uper block, inou- ypes. <b>tructure of Pr</b> rocess stages an aving context o <b>rocess Contro</b> rocess creation woking other p rocess, Process	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduce stration Architectur acture, System Adm sentation of Files e of the regular file, de assignment to a occess nd transitions, layo f a process, manipu l , signals, process te rograms, the user i Scheduling, system	History, System Str ption About Hardw etion to system conc e of UNIX OS, Intro ninistration directories, conver new file, allocation ut of system memor alation of the process ermination, awaiting	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other ry, the context of a P as address space. g process termination hell, system Boot ar	o inode, r file process,	7 6 7 7
II III IV V	G O In A Sy K In In su su su ty Sy Pu su Sy Pu su Sy Pu su Sy In In In In Sy Sy K N Sy Sy K N Sy Sy K N Sy Sy K N Sy K N Sy K N Sy Sy K N Sy K N Sy Sy K N Sy Sy K N Sy Sy K N Sy Sy Sy Sy Sy Sy Sy Sy Sy Sy Sy Sy Sy	eneral Overvie perating System <b>ntroduction to</b> architecture of U ystem Adminis ternel Data Stru- <b>nternal Repres</b> nodes, structure uper block, inou- pes. <b>tructure of Pr</b> rocess stages an aving context of <b>rocess Contro</b> rocess creation nvoking other p rocess, Process <b>nter Process C</b>	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduce stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a occess nd transitions, layo f a process, manipu I , signals, process tee rograms, the user i Scheduling, syster communication	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intro- ninistration directories, conver new file, allocation ut of system memori lation of the process ermination, awaiting d of a process, the s n call for time, cloc	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other cy, the context of a F address space. g process termination hell, system Boot ar k.	o inode, r file process, n, nd the Init	7 6 7 7
II III IV	G O In A S S K In In S S P P S S P P I S T T	eneral Overvie perating System <b>itroduction to</b> architecture of U ystem Adminis iternel Data Stru- <b>iternal Repres</b> nodes, structure uper block, inou- ypes. <b>tructure of Pr</b> rocess stages an aving context of <b>rocess Contro</b> rocess creation ivoking other p rocess, Process <b>nter Process C</b> ypes of IPCs, I	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduce stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a occess nd transitions, layo f a process, manipu I , signals, process teo rograms, the user i Scheduling, system	History, System Str ption About Hardw etion to system conc e of UNIX OS, Intro- ninistration directories, conver new file, allocation ut of system memor- ilation of the process ermination, awaiting d of a process, the s n call for time, cloc	are. eepts, Kernel Data Stooduction to system conduction to system conduction of a pathname to f disk blocks, other cy, the context of a Pass address space. g process termination hell, system Boot ark.	ructure, oncepts, o inode, r file Process, n, nd the Init , Shared	7 6 7 7
II III IV V	G O In A S S K In In In S S P P P S S P P In S S T P In S S T N S S M S S M S S M S S M S S M S S M S S	eneral Overvie perating System <b>itroduction to</b> architecture of U ystem Adminis iternel Data Stru- <b>iternal Repres</b> nodes, structure uper block, inou- ypes. <b>tructure of Pr</b> rocess stages an aving context of <b>rocess Contro</b> rocess creation ivoking other p rocess, Process <b>nter Process C</b> ypes of IPCs, I	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a ocess nd transitions, layo f a process, manipu l , signals, process te rograms, the user i Scheduling, syster communication mportance of IPC a ge Queue, Semapho	History, System Str ption About Hardw etion to system conc e of UNIX OS, Intro- ninistration directories, conver new file, allocation ut of system memor- ilation of the process ermination, awaiting d of a process, the s n call for time, cloc	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other cy, the context of a F address space. g process termination hell, system Boot ar k.	ructure, oncepts, o inode, r file Process, n, nd the Init , Shared	7 6 7 7 6
II III IV V	G O In A S S K In In In S S P P P S S P P In S S T P In S S T N S S M S S M S S M S S M S S M S S M S S	eneral Overvie perating System <b>htroduction to</b> architecture of U ystem Adminis ernel Data Stru- <b>hternal Repres</b> nodes, structure uper block, inou- ypes. <b>tructure of Pr</b> rocess stages an aving context o <b>rocess Contro</b> rocess creation nooking other p rocess, Process <b>hter Process C</b> ypes of IPCs, I femory, Massa	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a ocess nd transitions, layo f a process, manipu l , signals, process te rograms, the user i Scheduling, syster communication mportance of IPC a ge Queue, Semapho	History, System Str ption About Hardw etion to system conc e of UNIX OS, Intro- ninistration directories, conver new file, allocation ut of system memor- ilation of the process ermination, awaiting d of a process, the s n call for time, cloc	are. eepts, Kernel Data Stooduction to system conduction to system conduction of a pathname to f disk blocks, other cy, the context of a Pass address space. g process termination hell, system Boot ark.	ructure, oncepts, o inode, r file Process, n, nd the Init , Shared	7 6 7 7 6
II III IV V	G O In A Sy K In In su ty Si Pi sz P P Pi im pI In T M C	eneral Overvie perating System <b>introduction to</b> architecture of U ystem Adminis iernel Data Stru- <b>internal Repres</b> nodes, structure uper block, inou- pes. <b>tructure of Pr</b> rocess stages an aving context of <b>rocess Contro</b> rocess creation rocess, Process <b>inter Process C</b> ypes of IPCs, I femory, Massa omparison of v	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduce stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a occess nd transitions, layo f a process, manipu I , signals, process teo rograms, the user i Scheduling, system communication mportance of IPC a ge Queue, Semapho /arious IPCs	History, System Str ption About Hardw etion to system conc e of UNIX OS, Intro- ninistration directories, conver new file, allocation ut of system memor- alation of the process ermination, awaiting d of a process, the s n call for time, cloc and IPS (Inter proce- ore, MPI, Open MP <b>Text Books</b>	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other ry, the context of a F as address space. g process termination hell, system Boot ar k. ess Synchronization) P, Threads Vs Proces	ructure, oncepts, o inode, r file Process, n, nd the Init , Shared	7 6 7 7 6
II III IV V VI	G O In A S S K In In S S P P S S P P S S P P I S S C	eneral Overvie perating System <b>htroduction to</b> architecture of U ystem Adminis ernel Data Stru- <b>hternal Repres</b> nodes, structure uper block, inou- ypes. <b>tructure of Pr</b> rocess stages an aving context o <b>rocess Contro</b> rocess creation nooking other p rocess, Process <b>hter Process C</b> ypes of IPCs, I femory, Massa omparison of v	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a occess nd transitions, layo f a process, manipu l , signals, process te rograms, the user i Scheduling, system ommunication mportance of IPC a ge Queue, Semapho- various IPCs	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intr- ninistration directories, conver new file, allocation ut of system memor lation of the process ermination, awaiting d of a process, the s n call for time, cloc and IPS (Inter proce ore, MPI, Open MP <u>Text Books</u> <i>Operating System</i> ".	are. epts, Kernel Data Sto oduction to system c sion of a pathname t of disk blocks, other ry, the context of a P as address space. g process termination hell, system Boot ark k. ess Synchronization) r, Threads Vs Proces , PHI, 1994.	ructure, oncepts, o inode, r file Process, n, nd the Init , Shared s,	7 6 7 7 6
II III IV V VI	G O In A S S K In In S S P P S S P P S S P P I S S C	eneral Overvie perating System <b>htroduction to</b> architecture of U ystem Adminis ernel Data Stru- <b>hternal Repres</b> nodes, structure uper block, inou- ypes. <b>tructure of Pr</b> rocess stages an aving context o <b>rocess Contro</b> rocess creation nooking other p rocess, Process <b>hter Process C</b> ypes of IPCs, I femory, Massa omparison of v	Unix Internals w of the System - I m Services, Assum the Kernel UNIX OS, Introduc stration Architectur acture, System Adm sentation of Files of the regular file, de assignment to a occess nd transitions, layo f a process, manipu l , signals, process te rograms, the user i Scheduling, system ommunication mportance of IPC a ge Queue, Semapho- various IPCs	History, System Str ption About Hardw ction to system conc e of UNIX OS, Intr- ninistration directories, conver new file, allocation ut of system memor lation of the process ermination, awaiting d of a process, the s n call for time, cloc and IPS (Inter proce ore, MPI, Open MP <u>Text Books</u> <i>Operating System</i> ".	are. eepts, Kernel Data St oduction to system c sion of a pathname t of disk blocks, other ry, the context of a F as address space. g process termination hell, system Boot ar k. ess Synchronization) P, Threads Vs Proces	ructure, oncepts, o inode, r file Process, n, nd the Init , Shared s,	7 6 7 7 6

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.

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

Assessmer	Assessment Plan based on Bloom's Taxonomy Level							
Bloom's Taxonomy Level	MSE	ISE	ESE	Total				
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Apply	10	10	20	40				
Analyze	10	5	10	25				
Evaluate	10	5	10	25				
Create			10	10				
Total	30	20	50	100				

			1	Aided Autonomous	s Institute)	
				AY 2022-23 rse Information		
Drogra	mma		M.Tech. (CS a			
Progra			<u>`</u>	/		
	Semest e Code	er	First Year M. 6IT560	Tech., Selli I		
	e Coue e Name			adalaar		
	d Requi		Research Meth	odology		
	<u>u rioqu</u>		<u> </u>			
Te	aching	Scheme		Examination	n Scheme (Marks)	
Lectur	'e	-	LA1	LA2	Lab ESE	Total
Tutori	al	-	30	30	40	100
Practio	cal	-				
Intera	ction	2 Hrs/Week		C	redits: 2	
				urse Objectives		
1			<b>4</b>	with scientific me		
2			-	nd hypothesis for		
3	To eva			for data and resul		
				· · · · · · · · · · · · · · · · · · ·	Taxonomy Level	
			e students will			
CO1	-		rea for dissertation			Apply
CO2	· · · · · · · · · · · · · · · · · · ·	-	collection metho	ods		Analyze
CO3	Formu	late the resear	ch publication			Design
Modu	le		Mo			
			IVIU	dule Contents		Hours
	Int	troduction	1910	dule Contents		Hours
т					rch, Types of Resear	ch
Ι	Ob	jectives of l	Research, Mot	ivation in Resear	rch, Types of Resear rch, Various stages	ch, 5
Ι	Ob Re	jectives of l search Appr	Research, Mot	ivation in Resear	• • •	ch, 5
I	Ob Re res	jectives of l search Appr earch, Refere	Research, Mot	ivation in Resea icance of Resea	• • •	ch, 5
	Ob Re res <b>Re</b>	jectives of l search Appr earch, Refere search Prob	Research, Mot toaches, Signif ence collection <b>lem and Desig</b>	ivation in Resear ficance of Resear <b>n</b>	• • •	ch, 5 of 5
I	Ob Re res Re Se Inv	jectives of l search Appr earch, Refere search Prob lecting the P volved in De	Research, Mot oaches, Signif ence collection lem and Desig broblem, Neces efining a Prob	ivation in Resear ficance of Resear n sity of Defining lem, Fundamenta	the Problem, Technic als of Research Desi	ch, 5 of 5
	Ob Re res Re Se Inv Ne	jectives of l search Appr earch, Refere search Prob lecting the P volved in De ed for Research	Research, Mot oaches, Signif ence collection <b>lem and Desig</b> roblem, Neces efining a Prob rch Design, Dif	ivation in Resear ficance of Resear <b>n</b> sity of Defining	the Problem, Technic als of Research Desi	ch, 5 of 5
II	Ob Re res <b>Re</b> Sel Inv Ne <b>Da</b>	jectives of l search Appr earch, Refere search Prob lecting the P volved in De ed for Research ta Collection	Research, Mot oaches, Signif ence collection <b>lem and Desig</b> broblem, Neces efining a Prob rch Design, Dif <b>n Techniques</b>	ivation in Resear ficance of Resear <b>n</b> sity of Defining lem, Fundamenta fferent Research I	rch, Various stages the Problem, Technic als of Research Desi Designs	ch, of 5 jue gn, 4
	Ob Re res Re Se Inv Ne <b>Da</b> Co	jectives of l search Appr earch, Refere search Prob lecting the P volved in De ed for Research ta Collection llection of Pr	Research, Mot oaches, Signif ence collection lem and Desig roblem, Neces efining a Prob rch Design, Dif n Techniques rimary Data, Ol	ivation in Resear ficance of Resear <b>n</b> sity of Defining lem, Fundamenta ferent Research I	rch, Various stages the Problem, Technic als of Research Desi Designs d, Interview Method,	ch, of 5 jue gn, 4
II	Ob Re res Re Se Inv Ne Da Co Co	jectives of l search Appr earch, Refere search Prob lecting the P volved in De ed for Resear ta Collection llection of Pr llection of D	Research, Mot roaches, Signif ence collection <b>lem and Desig</b> problem, Neces efining a Prob rch Design, Dif <b>n Techniques</b> rimary Data, Ot ata through Sch	ivation in Reseau ficance of Reseau n sity of Defining lem, Fundamenta ferent Research I pservation Methoo nedules, Other Methoo	rch, Various stages the Problem, Technic als of Research Desi Designs	ch, of 5 jue gn, 4
II	Ob Re res Re Sel Inv Ne Da Co Co Co	jectives of l search Appr earch, Reference search Prob lecting the P volved in De- red for Research ta Collection llection of P llection of D occessing and	Research, Mot oaches, Signif ence collection lem and Desig broblem, Neces efining a Prob rch Design, Dif n Techniques timary Data, Of ata through Sch l Analysis of D	ivation in Resear ficance of Resear sity of Defining lem, Fundamenta ferent Research I pservation Methoo nedules, Other Me pata	rch, Various stages the Problem, Technic als of Research Desi Designs d, Interview Method, ethods of Data Collection	ch, of 5 pue gn, 4 ion 4
II III	Ob Re res Re Se Inv Ne Da Co Co Co	jectives of l search Appr earch, Refere search Prob lecting the P volved in De ed for Research ta Collection llection of P llection of D ocessing and pocessing Op	Research, Mot oaches, Signif ence collection lem and Desig roblem, Neces efining a Prob rch Design, Dif n Techniques rimary Data, Of ata through Sch l Analysis of D erations, Type	ivation in Resear ficance of Resear n sity of Defining lem, Fundamenta ferent Research I bservation Methoo hedules, Other Me bata es of Analysis,	rch, Various stages the Problem, Technic als of Research Desi Designs d, Interview Method, ethods of Data Collecti Statistics in Resear	ch, of 5 jue gn, 4 ion 4 ch,
Π	Ob Re res Re Se Inv Ne Da Co Co Co Pro Me	jectives of l search Appr earch, Reference search Prob lecting the P volved in De ed for Research that Collection illection of Pr illection of D occessing and peasures of As	Research, Mot oaches, Signif ence collection <b>lem and Desig</b> roblem, Neces efining a Prob rch Design, Dif <b>n Techniques</b> timary Data, Ol ata through Sch <b>l Analysis of D</b> erations, Type symmetry, Mea	ivation in Reseau ficance of Reseau n sity of Defining lem, Fundamenta ferent Research I poservation Methoo nedules, Other Me pata es of Analysis, asures of Relation	the Problem, Technic the Problem, Technic als of Research Desi Designs d, Interview Method, ethods of Data Collecti Statistics in Resear aship, Simple Regressi	ch, 5 of 5 que 4 gn, 4 ion 4 ch, 4
Ш	Ob Re res <b>Re</b> Sei Inv Ne <b>Da</b> Co Co Co <b>Da</b> Co Co Co	jectives of l search Appr earch, Reference search Prob lecting the P volved in De- red for Research that Collection llection of Phillection of D occessing and peasures of As- alysis, Mult	Research, Mot oaches, Signif ence collection lem and Desig Problem, Neces efining a Prob rch Design, Dif n Techniques rimary Data, Of ata through Sch l Analysis of D erations, Type symmetry, Mea iple Correlatio	ivation in Reseau ficance of Reseau n sity of Defining lem, Fundamenta ferent Research I poservation Methoo nedules, Other Me pata es of Analysis, asures of Relation	rch, Various stages the Problem, Technic als of Research Desi Designs d, Interview Method, ethods of Data Collecti Statistics in Resear	ch, 5 of 5 que 4 gn, 4 ion 4 ch, 4
II	Ob Re res Re Sei Inv Ne Da Co Co Co Co Co Co Co An As	jectives of l search Appr earch, Refere search Prob lecting the P volved in De ed for Research the Collection llection of P llection of D ocessing and becessing Op easures of As alysis, Mult sociation of A	Research, Mot oaches, Signif ence collection lem and Desig roblem, Neces efining a Prob rch Design, Dif n Techniques timary Data, Ol ata through Sch l Analysis of D erations, Type symmetry, Mea iple Correlatio Attributes	ivation in Reseau ficance of Reseau n sity of Defining lem, Fundamenta ferent Research I poservation Methoo nedules, Other Me pata es of Analysis, asures of Relation	the Problem, Technic the Problem, Technic als of Research Desi Designs d, Interview Method, ethods of Data Collecti Statistics in Resear aship, Simple Regressi	ch, 5 of 5 que 4 gn, 4 ion 4 ch, 4
II III IV	Ob Re res Re Sei Inv Ne Da Co Co Co Co Pro Me Am As Co	jectives of l search Appr earch, Reference search Prob lecting the Provolved in December and for Research the Collection of Pro- lection of Pro- lection of Drocessing and processing Op- easures of As- alysis, Mult sociation of As- proputers and As- provide the pro- section of As- provide the pro- temporter of As- provide the pro- temporter of As- provide the pro- section of As- provide the pro- temporter of As- pro- temporter of As- pro- pro- temporter of As- pro- temporter of As- pr	Research, Mot oaches, Signif ence collection lem and Desig roblem, Neces efining a Prob rch Design, Dif n Techniques rimary Data, Ol ata through Sch l Analysis of D erations, Type symmetry, Mea iple Correlatio Attributes d Research	ivation in Reseau ficance of Reseau n sity of Defining lem, Fundamenta ferent Research I observation Methoo nedules, Other Methoo nedules, Other Methoo pata es of Analysis, nsures of Relation on and Regressio	the Problem, Technic als of Research Desi Designs d, Interview Method, ethods of Data Collecti Statistics in Resear iship, Simple Regression , Partial Correlation	ch, of5que gn,4ion4ch, ion,4
II III	Ob Re res Re Sei Inv Ne Da Co Co Co Pr Me An As Co Ro	jectives of l search Appr earch, Reference search Prob lecting the Produced in De- red for Research the Collection llection of Pro- llection of Drocessing and processing Op- easures of As- alysis, Multi sociation of As- mputers and le of comput	Research, Motionaches, Signif ence collection lem and Desig Problem, Neces efining a Prob rch Design, Dif n Techniques timary Data, Ol ata through Sch l Analysis of D erations, Type symmetry, Mea iple Correlation Attributes d Research er in research p	ivation in Resear ficance of Resear isity of Defining lem, Fundamenta ferent Research I observation Method nedules, Other Method nedules, Nedules, Nedu	the Problem, Technic als of Research Desi Designs d, Interview Method, ethods of Data Collection Statistics in Resear aship, Simple Regression on , Partial Correlation	$ \begin{array}{c} \text{ch,}\\ \text{of} & 5\\ \\ \text{gue}\\ \text{gn,} & 4\\ \\ \begin{array}{c} \text{d}\\ \text{ion}\\ \text{ch,}\\ \text{ion}\\ \text{on,}\\ \end{array} $
II III IV	Ob Re res Re Sei Inv Ne Da Co Co Co Pr Pro Me An As Co Ro Te	jectives of l search Appr earch, Refere search Prob lecting the P volved in De ed for Resear ta Collection llection of Pr llection of Pr llection of D ocessing and becassing Op easures of As alysis, Mult sociation of A mputers and le of comput chniques, Da	Research, Moti oaches, Signif ence collection lem and Desig roblem, Neces efining a Prob rch Design, Dif n Techniques timary Data, Ol ata through Sch l Analysis of D erations, Type symmetry, Mea iple Correlation Attributes d Research er in research p ta Storage, Scie	ivation in Resear ficance of Resear isity of Defining lem, Fundamenta ferent Research I observation Method nedules, Other Method nedules, Nedules, Nedu	the Problem, Technic als of Research Desi Designs d, Interview Method, ethods of Data Collecti Statistics in Resear iship, Simple Regression , Partial Correlation	$ \begin{array}{c} \text{ch,}\\ \text{of} \\ \end{array} 5 \\ \text{que} \\ \text{gn,} \\ 4 \\ \hline \text{ch,}\\ \text{ion} \\ \text{ch,}\\ \text{on,} \\ \end{array} $
II III IV	Ob Re res Re Sei Inv Ne Da Co Co Co Pro Me An As Co Ro Te Te	jectives of l search Appr earch, Reference search Prob lecting the P volved in De- ed for Research the Collection illection of Pr illection of D occessing and becauses of As- alysis, Mult sociation of A proputers and le of comput chniques, Da chnical writ	Research, Moti coaches, Signif ence collection lem and Desig roblem, Neces efining a Prob rch Design, Dif n Techniques rimary Data, Ot ata through Sch l Analysis of D erations, Type symmetry, Mea iple Correlatio Attributes d Research er in research p ta Storage, Scie ing methods	ivation in Reseau icance of Reseau n sity of Defining lem, Fundamenta ferent Research I oservation Methoo nedules, Other Methoo eata es of Analysis, nsures of Relation on and Regression process, Data Anal entific Simulation	the Problem, Technic dls of Research Desi Designs d, Interview Method, ethods of Data Collecti Statistics in Resear ship, Simple Regression , Partial Correlation lysis and Visualization s, Plagiarism Checker	ch, of5que gn,4a4ion4ch, ion,4n4
II III IV V	Ob Re ress Re Sei Inv Ne Da Co Co Co Pro Me An As Co Ro Te Pa	jectives of l search Appr earch, Reference search Prob lecting the P volved in De- red for Research the Collection and the Collection illection of Pr illection of D occessing and becauses of As- alysis, Mult sociation of A mputers and le of comput chniques, Da chnical writ per Writing	Research, Motionaches, Signif ence collection lem and Desig Problem, Neces efining a Prob rch Design, Dif n Techniques timary Data, Olata through Sch l Analysis of D erations, Type symmetry, Mea iple Correlation Attributes d Research er in research p ta Storage, Scie ing methods g, Technical	ivation in Reseau icance of Reseau n sity of Defining lem, Fundamenta ferent Research I oservation Methoo nedules, Other Methoo nedu	the Problem, Technic als of Research Desi Designs d, Interview Method, ethods of Data Collection Statistics in Resear aship, Simple Regression on , Partial Correlation	ch, of5que gn,4a4ion4ch, ion,4n4
II III IV	Ob Re ress Re Sei Inv Ne Da Co Co Co Pr Pro Me An As Co Ro Te Paj dis	jectives of l search Appr earch, Refere search Prob lecting the P volved in De ed for Resear ta Collection llection of Pr llection of Pr llection of D ocessing and becessing Op easures of As alysis, Mult sociation of A mputers and le of comput chniques, Da chnical writ per Writing sertation/the	Research, Motionaches, Signif ence collection lem and Desig problem, Neces efining a Prob rch Design, Dif n Techniques rimary Data, Ol ata through Sch l Analysis of D erations, Type symmetry, Mea iple Correlation Attributes d Research er in research p ta Storage, Scie ing methods g, Technical sis	ivation in Resear ficance of Resear isity of Defining lem, Fundamenta ferent Research I observation Methoo nedules, Other Methoo nedules, Nedules, Nedu	the Problem, Technic dls of Research Desi Designs d, Interview Method, ethods of Data Collecti Statistics in Resear ship, Simple Regression , Partial Correlation lysis and Visualization s, Plagiarism Checker	ch, of5jue gn,4jue gn,4ion4ion4ion,4on,4ort,5

# List of Experiments:

- 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:
- 4. Literature Survey Using Web of Science
- 5. Literature Survey Using Scopus
- 6. Design a model for a engineering research
- 7. Compare between model and process in engineering research
- 8. Perform data analysis using modern engineering tools
- 9. 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

# **Text Books**

1	Kothari C. R, "Research Methodology", 2nd Edition, New Age International, 1990					
2	Chopra Deepak and Sondhi Neena, " <i>Research Methodology : Concepts and cases</i> ", 2nd Edition, Vikas Publishing House, New Delhi, 2015					
	Lanton, Vikas I donsning House, New Denn, 2015					

	Keierences
1	Melville Stuart and Goddard Wayne, "Research Methodology: An Introduction For Science &
1	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
3	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 &
0	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				
There are three components of lab assessment, LA1, LA2 and Lab ESE.				
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment Plan based on Bloom's Taxonomy level				
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember	To be used	To be used	To be used	To be used

Kenteniter	minimum	minimum	minimum	minimum
Understand	To be used	To be used	To be used	To be used
	minimum	minimum	minimum	minimum
Apply	10	10	10	30
Analyze	10	10	10	30
Evaluate	5	5	10	20
Create	5	5	10	20
Total	30	30	40	100

		Walchand Coll	ege of Engineerin	g, Sangli		
		1	ided Autonomous I	Institute)		
			AY 2022-23			
			rse Information			
Program		M.Tech. (CS and	,			
	lass, Semester First Year M. Tech., Sem I					
Course C		6IT551				
Course N		Advanced Algorit				
Desired 1	Requisites:	Data Structures, C	Computer Algorith	ms		
		I				
	ching Scheme	<b>T</b> 4.4		cheme (Marks)	<b>—</b> ( )	
Lecture	-	LA1	LA2	Lab ESE	Total	
Tutorial		30	30	40	100	
Practical			<b>C</b>			
Interacti	lon –		Cro	edits: 1		
		Cou	ırse Objectives			
1 T	To demonstrate the		•			
	To implement sho	<u> </u>	<u> </u>			
	-					
3 1	To compare the alg	rse Outcomes (CC		awan amy Laval		
At the en	d of the course, the			axonomy Level		
	Demonstrate graph		· · · · · · · · · · · · · · · · · · ·	d problems	Apply	
	mplement the sho	V			Apply	
	Design approxima				Create	
	Jesign approxima		i graph		Create	
		List of Evno	riments / Lab Act	ivities		
		List of Expe	Interns / Lat Act	1 1 11103		
List of E	xperiments:					
	es are to be carried	l out individually.				
	dent will perform	•		llowing areas.		
		~				

- 1. Implement the Elementary Graph Algorithms and MST
- Demonstrate the Single Source Shortest Path Algorithms
- 3. Implement the Multithreaded Algorithms and Matrix Operations
- 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							
Programme Outcomes (PO)							
	PO1	PO2	F	PO3	PO4	PO5	PO6
CO1	3			1			
CO2		2					
CO3				3		1	
		-	Assess	sment		· · · ·	
There are three	ee components of la	o assessment,	LA1, I	LA2 and I	Lab ESE.		
IMP: Lab ES	E is a separate head	of passing. LA	41, LA	A2 togethe	er is treated as I	n-Semester Evaluat	tion.
Assessment	Based on	Conducte	d by	Typic	al Schedule		Marks
LA1	Lab activities,	Lab Cou	rse		Week 1 to Week		30
LAI	attendance, journa	I Facult	Faculty		Marks Submission at the end of Week 6		
LA2	Lab activities,	Lab Cou	rse	During Week 7 to Week 12		30	
LAZ	attendance, journa	I Facult	y	Marks S	ubmission at the	e end of Week 12	50
Lab ESE	Lab activities,	Lab Cou	rse	During V	Week 13		40
Lau ESE	attendance, journa	I Facult	y	Marks S	ubmission at the	e end of Week 13	40
Week 1 indic	ates starting week of	f a semester. L	_ab act	ivities/La	b performance	shall include perfor	rming

Assessment Plan based on Bloom's Taxonomy level					
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total	
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Apply	10	10	10	30	
Analyze	10	10	10	30	
Evaluate	5	5	10	20	
Create	5	5	10	20	
Total	30	30	40	100	

			ege of Engineering							
(Government Aided Autonomous Institute) AY 2022-23										
			se Information							
Progra	mme	M.Tech. (CS and								
	Semester	First Year M. Tec	,							
,	Course Code 6IT552									
Course										
	I Requisites:         Operating System, (C/python) Programming language									
2 0011 00		operating bysee		<u>- 81 million 19 milli</u>	,•					
Te	aching Scheme		Examination S	cheme (Marks)						
Lectur		LA1	LA1 LA2 Lab ESE							
				(POE)						
Tutoria		30	30	40	100					
Practic			~							
Interac	ction -		Cree	dits: 1						
		<u> </u>								
1	To use verieus		rse Objectives							
1	To use various sys									
2	To elaborate the va	<b>1</b>			1.1					
3	<u> </u>	*		ng the real world p	roblems					
A 4 41		· · · · ·	) with Bloom's Ta	ixonomy Level						
	end of the course, the				A					
CO1	Illustrate the differ		<u> </u>	•	Apply					
CO2	Identify different s				Analyze					
<b>CO3</b> Implement various inter process communications available in operating Apply										
	system									
		List of Evner	iments / Lab Activ	vitios						
List of	Experiments:		Intents / Lab Activ							
	Experiments:									
	Processing Environr	nent•fork_vfork_v	vait_waitnid_exec.(	all variations exec) a	und exit					
	IPC: Interrupts and S		-		ind exit					
	File system Internals	•	•	, alarin, kin, signar						
4.	Threading concept: 1			s of java						
5.	IPC: Semaphore: ser			5						
6.	IPC: Message Queu									
7.	IPC: Shared memory									
8. IPC: Sockets: socket system calls in C/socket programming of Java/python.										
9. IPC: Pipe/FIFO										
	Scripting writing in									
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										
			1							
online	GitHub. Students sl	hould maintain ac	ctivity log book co	ontaining weekly pr	ogress					
-			<b>Fext Books</b>	» » DIII 1004						
1 Maurice J. Bach, "The Design of Unix Operating System", PHI, 1994.					2017					
2 Sumitabha Das, "Unix Concepts and Applications", TMGH, 4 <sup>th</sup> Edition, 2017.										
2	Sumitadha Das, (		<i></i>	, ,						
2	Sumitaona Das, C									
2		]	References							
	Beej Jorgensen, "	l Beej's Guide to U	References	Beej Jorgensen Hal						
2	Beej Jorgensen , " 1.1.2, December, 2	I Beej's Guide to U 2010	<b>References</b> Inix IPC", Brian -J	Beej Jorgensen Hal	l, Version					
	Beej Jorgensen , " 1.1.2, December, 2	Beej's Guide to U 2010 Ye Robbins, "UNI	<b>References</b> Inix IPC", Brian - X Systems Progra	Beej Jorgensen Hal umming: Communic	l, Version					

3	Eric Raymond, "Art of UNIX Programming", Pearson, 1st edition, October, 2003						
				T 0 1 <b>T</b> • 1			
				Jseful Links			
1	https://	users.cs.cf.ac.u	uk/Dave.Marsl	hall/C/			
2	https://	github.com/su	vratapte/Maur	ice-Bach-Note	S		
3	https://	github.com/mi	t-pdos/xv6-pu	ıblic			
4	https://www.geeksforgeeks.org/introduction-to-unix-system/						
5.	https://github.com/beejjorgensen/bgipc						
6.	6. http://www.di.uevora.pt/~lmr/syscalls.html						
	CO-PO Mapping						
	Programme Outcomes (PO)						
		PO1	PO2	PO3	PO4	PO5	PO6
C	01	3		3			
C	02		2				1
C	03	1			2		

1		LA2 and Lab ESE.						
is a senarate head of			There are three components of lab assessment, LA1, LA2 and Lab ESE.					
15 a separate field of	IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.							
Based on	Conducted by	Typical Schedule	Marks					
Lab activities,	Lab Course	During Week 1 to Week 6	30					
attendance, journal	Faculty	Marks Submission at the end of Week 6	50					
Lab activities,	Lab Course	During Week 7 to Week 12	30					
attendance, journal	Faculty	Marks Submission at the end of Week 12	50					
Lab activities,	Lab Course	During Week 13	40					
attendance, journal	Faculty	Marks Submission at the end of Week 13	40					
a a	Based on Lab activities, attendance, journal Lab activities, attendance, journal Lab activities, attendance, journal	Based onConducted byLab activities,Lab Courseattendance, journalFacultyLab activities,Lab Courseattendance, journalFacultyLab activities,Lab Courseattendance, journalFacultyLab activities,Lab Courseattendance, journalFaculty	Based onConducted byTypical ScheduleLab activities,Lab CourseDuring Week 1 to Week 6attendance, journalFacultyMarks Submission at the end of Week 6Lab activities,Lab CourseDuring Week 7 to Week 12attendance, journalFacultyMarks Submission at the end of Week 12Lab activities,Lab CourseDuring Week 13attendance, journalFacultyMarks Submission at the end of Week 13Attendance, journalFacultyMarks Submission at the end of Week 13					

Assessment Plan based on Bloom's Taxonomy Level					
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total	
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Apply	10	10	10	30	
Analyze	10	10	10	30	
Evaluate	5	5	10	20	
Create	5	5	10	20	
Total	30	30	40	100	

			ege of Engineering, S			
		(	ided Autonomous Inst. <b>XY 2022-23</b>	itute)		
			se Information			
Progran	nme	M.Tech. (CS and				
Class, Se		First Year M. Tech				
Course		6IT511				
Course I			ve - 1: Cloud and Vir	tualization Techniqu	<u>A</u> C	
		Computer Networl		tuanzation reeningu		
Desired Requisites:   Computer Networks						
Teaching Scheme Examination Scheme (Marks)						
Lecture	<u>v</u>	MSE	ISE	ESE	Total	
Tutorial		30	20	50	100	
Practica		50	20	50	100	
Interact			Credit	-c• 3		
meraci			Citui	13• J		
		Сон	rse Objectives			
1 7	To elaborate fundan	nentals of virtualizat	•			
			del in cloud computir	ומ		
	~ ~	nificance of virtualiz	<b>x</b>	0		
	<u>v</u>		) with Bloom's Taxo	nomy Level		
At the er		students will be abl	<i></i>			
	Use service model of				Apply	
			oy the services on clo	ud infrastructure	Apply	
		dels for data center a			Analyze	
			phonons		1 11111 / 20	
Module	2	Modu	e Contents		Hours	
Ι	Virtualization ar	<b>Cloud Computing</b> d Cloud Computing, Cloud Reference Model: IAAS, PAAS, ployment Model: Public Cloud, Private Cloud and Hybrid			7	
	Virtualization	attornis in industry				
II	Hosted and Bare	e-Meta, Server Virtualization, Desktop Virtualization, 6 tualization, Storage Virtualization				
III	Network Functions6Public Cloud Networking: Route53, Content Delivery Networks, Resilience6Infrastructure, Virtual Network Functions: Cloud Firewall, DNS, Load6Balancers, Intrusion Detection Systems6					
Virtual Private Clouds (VPC)IVVPC fundamentals, Public and Private Subnets, Security Groups, NetworkAccess Control List, Network Address Translation.						
V			outing, Data Managen n Cloud	nent in Cloud	7	
VI	Open Source and	Cloud Computing nd Commercial Clouds, Cloud Simulator, Research trend in ing, Fog Computing 6				
		<b>r</b>	Fort Dools			
			<b>Fext Books</b> 5. Thamarai Selvi. <i>"M</i>	lastering cloud comp	uting", Mc	
			,			
$\frac{1}{2}$	Graw Hill Education Thomas Erl, Zaigha	n, 3rd Edition, 2011	cardo Puttini, "Cloud	Computing: Concep	ts, Technology	

1	Richardo Puttini, Thomas Erl, and Zaigham Mahmood, "Cloud Computing: Concepts, Technology & Architecture", Pearson Prentice Hall, 2nd edition, 2013				
2	Srinivasan, J. Suresh, " <i>Cloud Computing: A practical approach for learning and implementation</i> ", 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.

Assessment Plan based on Bloom's Taxonomy Level				
<b>Bloom's Taxonomy Level</b>	MSE	ISE	ESE	Total
Remember	To be used minimum			
Understand	To be used minimum			
Apply	10	10	20	40
Analyze	10	5	10	25
Evaluate	10	5	10	25
Create			10	10
Total	30	20	50	100

				AY 2022-23		
			Co	urse Information		
Progra	amme		M.Tech. (CS an	nd IT)		
Class,	Seme	ster	First Year M. Te	ech., Sem I		
Cours	e Cod	e	6IT512			
Cours	e Nan	ne	Professional Ele	ctive - 1: Ruby & C	Go Programming Language	
Desire	d Req	uisites:	C & CPP Progra	amming		
		g Scheme		Examination	n Scheme (Marks)	
lectu	e	3 Hrs/week	MSE	ISE	ESE	Total
utori	al	-	30	20	50	100
racti	cal	-			· · · · ·	
ntera	ction	-		Cı	redits: 3	
		·	·			
				ourse Objectives		
1				Go Programming I		
2			~	ndling and error ha		
3	To d			guage for process s		
				CO) with Bloom's T	Faxonomy Level	
			students will be a			
CO1				ng concepts using I		Apply
CO2			<b>^</b>	ing using Ruby and	~ ~ ~	Apply
CO3	Anal	yze the Synchro	onization problem	using Go Language	е	Analyze
						1
Modu				odule Contents		Hours
Ι	E N N	Brief history of Jumbers, Text & Jil)	& Strings, Arrays	& running Ruby, C	Command Line Arguments, s, Expressions (True, False, bles	7
Π		<b>Tow Control &amp;</b> Conditionals, Lo Classes, Module Attributes, Inher Methods, Attribu	Statements and ops, Error & Exce s & Objects : Sim- itance, Persistence	<b>Properties</b> eption Handling, Th ple Ruby Classes, C e Setter & Getter met	rreads & Fibers	7
III	N S	leta-programmi trings, Variable	es, Missing Metho	Types, Modules & ds & Constants, Cu		6
IV	I In In	ntroduction to ntroduction, Pro ypes, files, scop	<b>Go Language</b> ogram Structure: n e, number, string		variables, assignments,	6
V	E ii	nterface, pointer	composite data ty rs, structs	-	trol statements, methods,	6
VI	Concurrency with Shared variables:					
	1	1				

2	Alan A. A. Donovan, Brian W. Kernighan, " <i>The Go Programming Language</i> ", Pears Education; First edition (1 February 2016)					
	References					
1	1 Yukihiro Matsumoto, David Flanagan, " <i>The Ruby Programming Language</i> ", Shroff,1 <sup>st</sup> Edition, 2008.					
2	Caleb Doxsey, " <i>An Introduction to Programming in Go</i> ", 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						
		Programm	ne Outcomes	( <b>PO</b> )		
	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.

Assessmen	Assessment Plan based on Bloom's Taxonomy Level				
Bloom's Taxonomy Level	MSE	ISE	ESE	Total	
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Apply	10	10	20	40	
Analyze	10	5	10	25	
Evaluate	10	5	10	25	
Create			10	10	
Total	30	20	50	100	

			(Government A	lege of Engineering, ided Autonomous Ins		
				AY 2022-23		
				rse Information		
Progra			M.Tech. (CS and	· · · · · · · · · · · · · · · · · · ·		
Class,			First Year M. Tec	ch., Sem I		
Cours			6IT513			
Cours	e Nam	ie		tive – 1: Artificial Int	elligence	
Desire	d Req	uisites:	Probability and L	inear Algebra		
		g Scheme		Examination S		
Lectu	re	3 Hrs/week	MSE	ISE	ESE	Total
Tutori	ial	-	20	20	60	100
Practi	cal	-			· · ·	
Intera	ction	-		Cred	its: 3	
				urse Objectives		
1	To c	ompare variou	is techniques in A	rtificial Intelligence	e	
2		<u> </u>	-		as of Artificial Intellige	ence
3				Artificial Intelligen		
•	101			D) with Bloom's Tay		
At the	end of		students will be ab	/		
$\frac{1}{CO1}$				ficial Intelligence		Apply
				-	Antificial	
CO2		ompare the architectural and functional structures of Artificial Analyse elligence				
<b>CO3</b>	Buil	d an expert sy	stem in Artificial	Intelligence		Create
		<b>` ` `</b>				
Modu	le		Μο	dule Contents		
			1110	une Contents		Hour
	A	I and Problen	1 Solving by Searc			Hour
Ι	Ir	ntroduction to A	n Solving by Searc	h	, Uninformed search,	7
	Ir H K	ntroduction to A leuristic search.	<b>A Solving by Searc</b> AI, Problem solving CSP problems <b>presentatio</b> n	<b>h</b> g as state space search		7
I	Ir H K Ir	ntroduction to A leuristic search, <b>Enowledge Rep</b> ntroduction, to 1	<b>Solving by Searc</b> AI, Problem solving CSP problems <b>resentatio</b> n Knowledge represe	h		
II	Ir H K Ir K	troduction to A leuristic search, <b>nowledge Rep</b> atroduction, to a <b>Enowledge Rea</b>	A Solving by Searc AI, Problem solving CSP problems presentation Knowledge represent soning	h g as state space search ntation, First order lo	gic-I	7
	Ir H K Ir K F	troduction to A leuristic search, <b>Inowledge Rep</b> troduction, to 1 <b>Inowledge Rea</b> irst order logic	A Solving by Searce AI, Problem solving CSP problems resentation Knowledge represent soning -II, Inference in First	<b>h</b> g as state space search	gic-I	7
II	Ir H K Ir K F d	troduction to A leuristic search, <b>nowledge Rep</b> ntroduction, to A <b>nowledge Rea</b> irst order logic- ecision network	A Solving by Searce AI, Problem solving CSP problems resentation Knowledge represent soning -II, Inference in First	h g as state space search ntation, First order lo	gic-I	7
II	Ir H K Ir K F d d	troduction to A leuristic search, <b>Enowledge Rep</b> ntroduction, to E <b>Enowledge Rea</b> irst order logic- ecision network lanning	A Solving by Searc AI, Problem solving CSP problems Presentation Knowledge represe soning -II, Inference in First	h g as state space search ntation, First order lo st order logic-I, Baye	gic-I sian network,	7 7 6
II	Ir H K Ir K F dd P Ir	troduction to A leuristic search, <b>nowledge Rep</b> troduction, to a <b>nowledge Rea</b> irst order logic- ecision network lanning ntroduction to F	A Solving by Searc AI, Problem solving CSP problems Presentation Knowledge represe soning -II, Inference in First	h g as state space search ntation, First order lo	gic-I sian network,	7
II III	Ir H K Ir K F du P Ir G	Attroduction to A leuristic search, <b>Inowledge Rep</b> Attroduction, to A <b>Inowledge Rea</b> irst order logic- ecision network <b>Ianning</b> Attroduction to F braphplan	A Solving by Searc AI, Problem solving CSP problems resentation Knowledge represe soning II, Inference in First Planning, Plan space	h g as state space search ntation, First order lo st order logic-I, Baye	gic-I sian network,	7 7 6
II III IV	Ir H K Ir K F du P Ir G	troduction to A leuristic search, <b>Inowledge Rep</b> ntroduction, to A <b>Inowledge Rea</b> irst order logic- ecision network lanning ntroduction to F raphplan <b>Iachine Learn</b>	A Solving by Searc AI, Problem solving CSP problems resentation Knowledge represent soning II, Inference in First Planning, Plan space ing	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning	gic-I sian network, graph and	7 7 6
II III	Ir H K F du P Ir G W	troduction to A leuristic search, <b>Enowledge Rep</b> introduction, to A <b>Enowledge Rea</b> irst order logic- ecision network lanning introduction to F fraphplan <b>fachine Learn</b> introduction to N	A Solving by Searc AI, Problem solving CSP problems presentation Knowledge represe soning II, Inference in First Planning, Plan space ing AL, Learning decisi	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem	gic-I sian network, graph and	7 7 6
II III IV	Ir H K Ir K F du P Ir G M Ir L	Attroduction to A leuristic search, <b>Enowledge Rep</b> introduction, to 1 <b>Enowledge Rea</b> irst order logic- ecision network lanning htroduction to F fraphplan <b>fachine Learn</b> htroduction to N earning in neur	A Solving by Searc AI, Problem solving CSP problems resentation Knowledge represent soning II, Inference in First Planning, Plan space ing	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem	gic-I sian network, graph and	7 7 6 6
II III IV V	Ir H K Ir K F dd P Ir G V Ir L E	troduction to A leuristic search, <b>Inowledge Rep</b> ntroduction, to A <b>Inowledge Rea</b> irst order logic- ecision network <b>Ianning</b> ntroduction to F raphplan <b>Iachine Learn</b> ntroduction to M earning in neur <b>xpert systems</b>	A Solving by Searc AI, Problem solving CSP problems resentation Knowledge represe soning II, Inference in First Planning, Plan space ing AL, Learning decisi al network, Deep L	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem learning: A review.	gic-I sian network, graph and ent learning,	7 7 6 6
II III IV	Ir H K Ir K F du F Ur G V Ir C C Ir L Ir	troduction to A leuristic search, <b>Inowledge Rep</b> introduction, to A <b>Inowledge Rea</b> irst order logic- ecision network lanning troduction to F raphplan <b>Iachine Learn</b> introduction to N earning in neur <b>xpert systems</b> introduction, Fu	A Solving by Searce AI, Problem solving CSP problems resentation Knowledge represent soning II, Inference in First Planning, Plan space ing AL, Learning decisi al network, Deep L nctionality /compor	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem learning: A review.	gic-I sian network, graph and	7 6 6
II III IV V	Ir H K Ir K F du F Ur G V Ir C C Ir L Ir	troduction to A leuristic search, <b>Inowledge Rep</b> ntroduction, to A <b>Inowledge Rea</b> irst order logic- ecision network <b>Ianning</b> ntroduction to F raphplan <b>Iachine Learn</b> ntroduction to M earning in neur <b>xpert systems</b>	A Solving by Searce AI, Problem solving CSP problems resentation Knowledge represent soning II, Inference in First Planning, Plan space ing AL, Learning decisi al network, Deep L nctionality /compor	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem learning: A review.	gic-I sian network, graph and ent learning,	7 7 6 6 7
II III IV V	Ir H K Ir K F du F Ur G V Ir C C Ir L Ir	troduction to A leuristic search, <b>Inowledge Rep</b> introduction, to A <b>Inowledge Rea</b> irst order logic- ecision network lanning troduction to F raphplan <b>Iachine Learn</b> introduction to N earning in neur <b>xpert systems</b> introduction, Fu	A Solving by Searc AI, Problem solving CSP problems oresentation Knowledge represe soning II, Inference in First Planning, Plan space ing AL, Learning decisi al network, Deep L nctionality /compor ert system	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem earning: A review. nents of Expert syster	gic-I sian network, graph and ent learning,	7 7 6 6 7
II III IV V VI	Ir H K Ir K F da P Ir G V Ir L Ir L E Ir B	Attroduction to A leuristic search, <b>Enowledge Rep</b> introduction, to E <b>Enowledge Rea</b> irst order logic- ecision network lanning introduction to F aphplan <b>fachine Learn</b> introduction to M earning in neuring <b>xpert systems</b> introduction, Fur- uilding an Exp	A Solving by Searc AI, Problem solving CSP problems resentation Knowledge represent soning II, Inference in First Planning, Plan space ing AL, Learning decision al network, Deep L nctionality /comport ert system	h s as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem earning: A review. nents of Expert syster <b>Text Books</b>	gic-I sian network, graph and ent learning, ns, Architecture of ES,	7 7 6 6 7 6
II III IV V	Ir H K F du F Ur G N Ir L Ir B Kich	troduction to A leuristic search, <b>Inowledge Rep</b> introduction, to E <b>Inowledge Rea</b> irst order logic- ecision network lanning troduction to F raphplan <b>Iachine Learn</b> introduction to N earning in neur <b>xpert systems</b> introduction, Fur uilding an Exp Elaine and Kel	A Solving by Searce AI, Problem solving CSP problems resentation Knowledge represent soning II, Inference in First Planning, Plan space ing AL, Learning decisi al network, Deep L nctionality /comport ert system	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem earning: A review. nents of Expert syster Text Books Artificial Intelligence	gic-I sian network, graph and ent learning, ns, Architecture of ES,	7 7 6 6 7 6
II III IV V VI	Ir H K F du F du Ir G V Ir L Ir B Rich Janak	troduction to A leuristic search, <b>Inowledge Rep</b> introduction, to E <b>Inowledge Rea</b> irst order logic- ecision network lanning troduction to F raphplan <b>Iachine Learn</b> introduction to N earning in neur <b>xpert systems</b> introduction, Fur uilding an Exp Elaine and Kel	A Solving by Searce AI, Problem solving CSP problems resentation Knowledge represent soning II, Inference in First Planning, Plan space ing AL, Learning decisi al network, Deep L nctionality /comport ert system	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem earning: A review. nents of Expert syster Text Books Artificial Intelligence	gic-I sian network, graph and ent learning, ns, Architecture of ES,	7 7 6 6 7 6
II III IV V VI	Ir H K F du F du Ir G V Ir L Ir B Rich Janak	Attroduction to A leuristic search, <b>Enowledge Rep</b> introduction, to E <b>Enowledge Rea</b> irst order logic- ecision network lanning throduction to F fraphplan <b>fachine Learn</b> introduction to N earning in neur <b>xpert systems</b> introduction, Fu- uilding an Exp Elaine and Kel ciraman et al.,	A Solving by Searce AI, Problem solving CSP problems presentation Knowledge represent soning II, Inference in First Planning, Plan space ing ML, Learning decising al network, Deep L nctionality /comport ert system vin Knight ,Nair, " <i>Foundations of Art</i>	h g as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem earning: A review. nents of Expert syster Text Books Artificial Intelligence	gic-I sian network, graph and ent learning, ns, Architecture of ES,	7 7 6 6 7 6
II III IV V VI	Ir H K F du F U Ir G N Ir L E F Ir B Kich Janah Ltd.,	Antroduction to A leuristic search, <b>Inowledge Rep</b> introduction, to A <b>Inowledge Rea</b> irst order logic- ecision network lanning atroduction to F raphplan <b>Iachine Learn</b> introduction to N earning in neur <b>xpert systems</b> atroduction, Fur uilding an Exp Elaine and Kel ciraman et al., 2 2007.	A Solving by Searce AI, Problem solving CSP problems presentation Knowledge represent soning II, Inference in First Planning, Plan space ing AL, Learning decision al network, Deep L nctionality /comport ert system vin Knight ,Nair, " <i>'Foundations of Art</i>	h s as state space search ntation, First order lo st order logic-I, Baye e planning, Planning ion tress, Reinforcem earning: A review. nents of Expert syster <b>Text Books</b> <i>Artificial Intelligence at</i> <i>References</i>	gic-I sian network, graph and ent learning, ns, Architecture of ES,	7 7 6 6 7 6 7 6

2	course on NPTEL/SWAYAM by <b>Prof. Shyamanta M Hazarika</b> , 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					
	Programme 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.

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.

Assessment Plan based on Bloom's Taxonomy Level				
Bloom's Taxonomy Level	MSE	ISE	ESE	Total
Remember	To be used minimum			
Understand	To be used minimum			
Apply	10	10	20	40
Analyze	10	5	10	25
Evaluate	10	5	10	25
Create			10	10
Total	30	20	50	100

				Y 2022-23		
			1	se Information		
Progra			M.Tech. (CS and			
Class,			First Year M. Tec	h., Sem I		
Course			6IT514			
Course			Professional Elect	ive - 2: Advanced D	istributed Computing	
Desire	d Requ	uisites:				
		g Scheme		Examination Scho		
Lectur		3 Hrs/week	MSE	ISE		Total
Tutori		-	30	20	5	100
Practio		-				
Intera	ction	_		Credi	its: 3	
				rse Objectives		
1				rn distributed system	8	
2			distributed architect			
3	To ev	<b>A</b>	and distributed com			
			· · · · · · · · · · · · · · · · · · ·	) with Bloom's Taxe	onomy Level	
			students will be able			
CO1			various big data ana			Analyze
CO2	-		-	t distributed environr		Analyze
CO3			ty and performance	of various algorithms	s of distributed	Evaluate
005	system	m				
	-			~ ~		
Modu				lule Contents		Hours
•			Distributed System			6
Ι		Task Creation and Termination (Async, Finish), Tasks in Java's Fork/Join Framework, Computation Graphs, Work, Span, Multiprocessor Scheduling				
		ramework. Com	mutation ( -ranha M			
			<u>^</u> ^	<u>^</u>	essor Scheduling	
		istributed Syst	em with Parallelis	m:		
	P	istributed Syst arallel Speedup	em with Parallelis	m: eciprocal Array Sum	using Async- Finish,	
II	Pa R	istributed Syst arallel Speedup eciprocal Array	em with Parallelis	m:	using Async- Finish,	7
II	Pa R Fi	istributed Syst arallel Speedup eciprocal Array ramework	em with Parallelist , Amdahl's Law, Re Sum using Recursi	m: eciprocal Array Sum	using Async- Finish,	7
	P: R F: F:	istributed Syst arallel Speedup eciprocal Array ramework unctional Para	em with Parallelis , Amdahl's Law, Re Sum using Recursi llelism:	m: eciprocal Array Sum ve Action's in Java's	using Async- Finish, Fork/Join	
II	Pa R Fi Fi Fi	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks wi	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/.	using Async- Finish, Fork/Join Join Framework,	7
	Pa R Fi Fi Fi N	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks wa lemorization, Ja	em with Parallelist , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr	using Async- Finish, Fork/Join Join Framework,	
	P: R Fi Fi Fi N D	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja ata flow Synch	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pig	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr pelining:	using Async- Finish, Fork/Join Join Framework, n	
III	Pa R Fi Fi Fi N D Sj	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja ata flow Synch plit-phase Barrie	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pig	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr	using Async- Finish, Fork/Join Join Framework, n	6
	Pa R Fri Fri M D Sj Pri	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks w Iemorization, Ja tata flow Synch plit-phase Barrich hasers,	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pig ers with Java Phase	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr pelining: rs, Point-to-Point Syr	using Async- Finish, Fork/Join Join Framework, n nchronization with	
III	PR R Fr Fr M D Sp Pr O	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja tata flow Synch plit-phase Barrich hasers, me-Dimensional	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pig ers with Java Phase	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr pelining: rs, Point-to-Point Syr	using Async- Finish, Fork/Join Join Framework, n	6
III	P R F F M D S P O O F	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja tata flow Synch plit-phase Barrich hasers, one-Dimensional low Parallelism	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pig ers with Java Phase I Iterative Averagin	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr pelining: rs, Point-to-Point Syr	using Async- Finish, Fork/Join Join Framework, n nchronization with	6
III IV	PA R Fi F M D S J P O C F I D	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja ata flow Synch plit-phase Barrich hasers, me-Dimensional low Parallelism vistributed Mag	em with Parallelist , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pig ers with Java Phaser I Iterative Averagin o Reduce:	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr <b>belining:</b> rs, Point-to-Point Syr g with Phasers, Pipeli	using Async- Finish, Fork/Join Join Framework, n achronization with ine Parallelism, Data	6
III	PA R Fi F M D S J P O C F. D L I	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks w Iemorization, Ja tata flow Synch plit-phase Barrich hasers, me-Dimensiona low Parallelism istributed Map atroduction to Mag	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pip ers with Java Phase I Iterative Averagin D Reduce: Iap-Reduce, Hadoop	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/, aces and Determinisr <b>pelining:</b> rs, Point-to-Point Syr g with Phasers, Pipeli p Framework, Spark	using Async- Finish, Fork/Join Join Framework, n Inchronization with ine Parallelism, Data Framework, TF-	6
III IV	Provide the second seco	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja tata flow Synch plit-phase Barrich hasers, ne-Dimensional low Parallelism istributed Map introduction to M DF Example, Pa	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pip ers with Java Phase I Iterative Averagin D Reduce: Iap-Reduce, Hadoop	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr <b>belining:</b> rs, Point-to-Point Syr g with Phasers, Pipeli	using Async- Finish, Fork/Join Join Framework, n Inchronization with ine Parallelism, Data Framework, TF-	6
III IV	P. R F F M D S P O F T D I I I I I I I I I I I I I I I I I	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja tat flow Synch plit-phase Barrich hasers, one-Dimensional low Parallelism vistributed Map atroduction to M DF Example, Pa park	em with Parallelist , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pig ers with Java Phase I Iterative Averagin D Reduce: Iap-Reduce, Hadooj ge Rank Example, I	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/, aces and Determinisr <b>pelining:</b> rs, Point-to-Point Syr g with Phasers, Pipeli p Framework, Spark	using Async- Finish, Fork/Join Join Framework, n Inchronization with ine Parallelism, Data Framework, TF-	6
III IV V	PA R Fi F D S P P O O F I U U C	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja ata flow Synch plit-phase Barrich hasers, me-Dimensional low Parallelism pistributed Map introduction to M DF Example, Pa park lient-Server Pi	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pig ers with Java Phase I Iterative Averagin o Reduce: Iap-Reduce, Hadooj ge Rank Example, I rogramming:	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr <b>pelining:</b> rs, Point-to-Point Syn g with Phasers, Pipeli p Framework, Spark I Demonstration: Page	using Async- Finish, Fork/Join Join Framework, n achronization with ine Parallelism, Data Framework, TF- Rank Algorithm in	6 7 7 7
III IV	PA R Fi F M D S P P O O F : D I I I I I I I I I I I I I I I	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja tata flow Synch plit-phase Barrich hasers, me-Dimensional low Parallelism throduction to Mo DF Example, Pa park lient-Server Pri throduction to Second	em with Parallelis , Amdahl's Law, Re Sum using Recursi llelism: ith Return Value, Fu- va Streams, Data R ronization and Pip ers with Java Phaser l Iterative Averagin D Reduce: Iap-Reduce, Hadoop ge Rank Example, I rogramming: Dockets, Serialization	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr <b>pelining:</b> rs, Point-to-Point Syr g with Phasers, Pipeli p Framework, Spark Demonstration: Page	using Async- Finish, Fork/Join Join Framework, n Ichronization with ine Parallelism, Data Framework, TF- Rank Algorithm in note Method Invocation	6 7 7 7
III IV V	PA R F F F M D S S P O O F C I I I I I I I I I I I I I I I I I I	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja tata flow Synch plit-phase Barrich hasers, one-Dimensional low Parallelism theroduction to M DF Example, Pa park lient-Server Pi attroduction to So fulticast Sockets	em with Parallelis , Amdahl's Law, Re Sum using Recursi llelism: ith Return Value, Fu- va Streams, Data R ronization and Pip ers with Java Phaser l Iterative Averagin D Reduce: Iap-Reduce, Hadoog ge Rank Example, I rogramming: pockets, Serialization s, Publish-Subscribe	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr <b>pelining:</b> rs, Point-to-Point Syn g with Phasers, Pipeli p Framework, Spark I Demonstration: Page	using Async- Finish, Fork/Join Join Framework, n Ichronization with ine Parallelism, Data Framework, TF- Rank Algorithm in note Method Invocation	6 7 7 7
III IV V	PA R F F F M D S S P O O F C I I I I I I I I I I I I I I I I I I	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja tata flow Synch plit-phase Barrich hasers, me-Dimensional low Parallelism throduction to Mo DF Example, Pa park lient-Server Pri throduction to Second	em with Parallelis , Amdahl's Law, Re Sum using Recursi llelism: ith Return Value, Fu- va Streams, Data R ronization and Pip ers with Java Phaser l Iterative Averagin D Reduce: Iap-Reduce, Hadoog ge Rank Example, I rogramming: pockets, Serialization s, Publish-Subscribe	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr <b>pelining:</b> rs, Point-to-Point Syr g with Phasers, Pipeli p Framework, Spark Demonstration: Page	using Async- Finish, Fork/Join Join Framework, n Ichronization with ine Parallelism, Data Framework, TF- Rank Algorithm in note Method Invocation	6 7 7 7
III IV V	PA R F F F M D S S P O O F C I I I I I I I I I I I I I I I I I I	istributed Syst arallel Speedup eciprocal Array ramework unctional Para utures: Tasks with lemorization, Ja tata flow Synch plit-phase Barrich hasers, one-Dimensional low Parallelism theroduction to M DF Example, Pa park lient-Server Pi attroduction to So fulticast Sockets	em with Parallelis , Amdahl's Law, Re Sum using Recursi Ilelism: ith Return Value, Fu va Streams, Data R ronization and Pip ers with Java Phase I Iterative Averagin o Reduce: Iap-Reduce, Hadooj ge Rank Example, I rogramming: ockets, Serialization s, Publish-Subscribe kets	m: eciprocal Array Sum ve Action's in Java's utures in Java's Fork/. aces and Determinisr <b>pelining:</b> rs, Point-to-Point Syr g with Phasers, Pipeli p Framework, Spark Demonstration: Page	using Async- Finish, Fork/Join Join Framework, n Ichronization with ine Parallelism, Data Framework, TF- Rank Algorithm in note Method Invocation	6 7 7 7

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

	CO-PO Mapping									
Programme Outcomes (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

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.

Assessment Plan based on Bloom's Taxonomy Level							
Bloom's Taxonomy Level	MSE	ISE	ESE	Total			
Remember	To be used minimum						
Understand	To be used minimum						
Apply	10	10	20	40			
Analyze	10	5	10	25			
Evaluate	10	5	10	25			
Create			10	10			
Total	30	20	50	100			

			Walchand Coll	ege of Engineering	g. Sangli	
				ided Autonomous I		
				AY 2022-23	,	
			Cour	rse Information		
Progra	amme		M.Tech. (CS and	IT)		
Class,			First Year M. Tec			
Cours			6IT515			
Course Name         Professional Elective - 2: Modern Application Development						
		uisites:	Web Technology			
			wee reeniorogy			
Te	eachin	g Scheme		Examination	Scheme (Marks)	
Lectur		3 Hrs/week	MSE	ISE	ESE	Total
Tutori		-	30	20	50	100
Practi		_				
Intera		_		Cre	edits: 3	
		1				
			Cou	rse Objectives		
1	To d	emonstrate the s	static and dynamic	<u> </u>		
2			s for web using Scr			
3			nsive web pages	1 000		
			rse Outcomes (CC	)) with Bloom's T	axonomy Level	
At the	end of		students will be ab	<u>,</u>	<u> </u>	
CO1			ements and propert		applications.	Apply
CO2			ynamic web application			Create
CO3		<b>A</b>	responsive web app			Create
000	10051	gir und de verop		incutions.		Create
Modu	le		Mod	ule Contents		Hours
		ITML 5 and B				
			ting Started, Grid S	System, Fixed Lavo	out. Fluid Lavout.	
			out, Typography	,,,,,,,, .	,,	
I		ootstrap Basic				7
				n Groups, Grid, Tal	ole, Form, Alert, Wells,	
			Panels, Pagination,			
			t Group, Dropdown			
		ntroduction to				
				Modules, HTTP M	Iodule, URL Module,	
		-			e Globals, Node.js OS,	
II		imer, Errors		_		7
	N	ode JS Basics:				
		Buffers, Streams, File System, Path, String Decoder, Query String, ZLIB,				
			allbacks, Events, Pu	unycode, TTY, We	b Modules	
		lode JS and My				
III			on, Create Database			6
			ecord, Select Reco	rd, Select Unique,	Drop Table	
		leactJS:				
			nplating using JSX	-		
IV		•	Rendering List and			6
			Immutable.js, Serv	rice Side Rendering	, Unit Testing,	
	V	Vebpack				
	<b>–</b>	ython Framew	ork ·			
		•		of Diango The	Basics of Dynamic, Web	
v					a Database: Models, The	
· ·			tration Site, Form P			6
			Sessions and Cookie		Linuit Linuit	
	1			••		

VI	Ruby On Rails :Introduction, RVM(ruby version manager), Working in Linux(Ubuntu) Platform,Ruby Operators & Ruby Shell, Ruby Data types & Variables, Ruby methods andmodules, OOP in Ruby, Basic loops and iterators.Rails :Rails Installation and Ruby gems, Databases, Statements, RAILS Model,Controller, and Views	7
	Text Books	
1	Benjamin Jakobus, "Mastering Bootstrap 4", Packt Publisher, 2nd Edition, 2018	
2	Jake Spurlock, " <i>Bootstrap: Responsive Web Development</i> ", O'Reilly Publication, 2013	1st Edition,
3	Ethan Brown, "Web Development using Node and Express", O'Really Publisher, 1 2014.	st Edition,
	References	
1	Daniel Rubio," <i>Beginning Django Web Application Development and Deployment</i> ApressPublication,1st Edition,2017	with Python",
2	Michael Hartl," <i>Ruby on Rails 3 Tutorial Learn Rails by Example</i> ", Pearson Educa Publication,1 <sup>st</sup> Edition,2010	ation
	Useful Links	
1	https://www.tutorialsteacher.com/nodejs/nodejs-tutorials	
2	https://morioh.com/p/656c3d9c1bce	
3	https://www.tutorialrepublic.com/twitter-bootstrap-tutorial/	
4	https://morioh.com/p/11c3e757a913	
5	https://www.djangoproject.com/start/	

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

Assessment Plan based on Bloom's Taxonomy Level								
Bloom's Taxonomy Level	MSE	ISE	ESE	Total				
Remember	To be used minimum							
Understand	To be used minimum							
Apply	10	10	20	40				
Analyze	10	5	10	25				
Evaluate	10	5	10	25				
Create			10	10				
Total	30	20	50	100				

				ege of Engineering				
			1	ided Autonomous Ir	<i>istitute)</i>			
				AY 2022-23				
D				se Information				
ProgrammeM.Tech. (CS and IT)Class, SemesterFirst Year M. Tech., Sem I								
			First Year M. Tech	h., Sem I				
Cours			6IT516	·		•.•		
Course NameProfessional Elective - 2: Image Processing and Pattern RecoDesired Requisites:Mathematics-(Matrix, Fourier Transformation)					ognition			
Desire	d Req	uisites:	Mathematics-(Mat	trix, Fourier Transfo	ormation)			
Т	o obin	~ Cabana		Enemination	Sahama (Marlız)			
		g Scheme 3 Hrs/week	MCE		Scheme (Marks)	Tatal		
Lectur		3 Hrs/week	MSE	<b>ISE</b> 20	<b>ESE</b> 50	Total		
<u>Futori</u>		-	30	20	50	100		
Practio		-		C	14 0			
Intera	ction	-		Cre	dits: 3			
			Car	man Ohiostimaa				
1	Tere	nly mothamat		rse Objectives	a			
1 2			cal transformation f		S			
$\frac{2}{3}$			enhancement technic processing applicati					
3	Toe		irse Outcomes (CC		wanamy Laval			
A 4 4 la a	and af			·	axonomy Level			
CO1			students will be ab		onnlightion	Apply		
CO1			digital image proce			Apply		
CO2			he frequency domai			Apply		
05	Anai	yze mages m t	ne frequency domai	n using various trai	ISTOTIIIS	Analyze		
Modu			Modu	le Contents		Hours		
WIUUU		atraduction or	d Pixel Relationsh			IIUUIS		
			Processing ,Some A		e Processing_			
T				7				
1	I Fundamental steps in DIP, Components of digital image processing,					7		
	6		sampling, quantization, Pixel Relationships in images, Distance					
		ampling, quai			n images, Distance			
	n	ampling, quai neasurements, I	Data structure for im	age representation	n images, Distance			
II	n Iu	ampling, quan neasurements, I <b>nage Operatio</b>	Data structure for im	age representation ons				
II	n II A	ampling, quan neasurements, I <b>mage Operatio</b> rithmetic opera	Data structure for im <b>ons and Interpolation</b> ations, Logical operations	age representation ons		7		
	n Iu A ir	ampling, quan neasurements, I <b>mage Operatio</b> rithmetic opera nterpolation tec	Data structure for im <b>ons and Interpolati</b> e ations, Logical opera- hniques	age representation ons		7		
II III	m Iu A ir Iu	ampling, quan neasurements, I <b>nage Operatio</b> rithmetic opera nterpolation tec <b>nage Transfo</b>	Data structure for im <b>ons and Interpolati</b> e ations, Logical opera- hniques	age representation ons ations, Geometrical	operations , Image			
III	m b A ir b N	ampling, quan neasurements, I <b>nage Operatio</b> rithmetic opera nterpolation tec <b>nage Transfo</b>	Data structure for im <b>ons and Interpolation</b> ations, Logical operations, hniques <b>mation</b> mation, DFT and pr	age representation ons ations, Geometrical	operations , Image	7 6		
	m Iu A ir Iu N U	ampling, quan neasurements, I mage Operation rithmetic opera- nage Transfor feed of transfor nage Enhance	Data structure for im <b>ons and Interpolation</b> ations, Logical operations, hniques <b>mation</b> mation, DFT and pr	age representation ons ations, Geometrical operties, convolutio	operations , Image	7		
III	m h A ir h N N h P	ampling, quan neasurements, I mage Operation rithmetic opera- nage Transfor feed of transfor nage Enhance	Data structure for im <b>ons and Interpolation</b> ations, Logical opera- hniques <b>mation</b> mation, DFT and pr <b>ment</b> ,Spatial filtering tec	age representation ons ations, Geometrical operties, convolutio	operations , Image	7 6		
III	m Lu A ir Lu N U P Lu	ampling, quan neasurements, I <b>mage Operatio</b> arithmetic opera- naterpolation tech mage Transfor leed of transfor mage Enhance oint operations mage Segment	Data structure for im <b>ons and Interpolation</b> ations, Logical opera- hniques <b>mation</b> mation, DFT and pr <b>ment</b> ,Spatial filtering tec	age representation ons ations, Geometrical operties, convolutio	operations , Image on Theorem, DCT y domain filtering	7 6 6		
III IV	m Lu A ir Lu N Lu P Lu C	ampling, quan measurements, I mage Operation rithmetic opera- interpolation tect mage Transfor feed of transfor mage Enhance oint operations mage Segment lassification	Data structure for im pass and Interpolation ations, Logical opera- hniques mation mation, DFT and pr ment ,Spatial filtering tec- ation	age representation ons ations, Geometrical operties, convolutio chniques, Frequency ation, Edge deteo	operations , Image on Theorem, DCT y domain filtering	7 6 6		
III IV	m b A ir b N b P b C c te	ampling, quan measurements, I mage Operation rithmetic opera- interpolation tect mage Transfor feed of transfor mage Enhance oint operations mage Segment flassification of echniques, Regi	Data structure for im ons and Interpolation ations, Logical opera- hniques mation mation, DFT and pr ment ,Spatial filtering tec ation of Image segments	age representation ons ations, Geometrical operties, convolution chniques, Frequency ation, Edge detectues	operations , Image on Theorem, DCT y domain filtering	7 6 6		
III IV V	m A ir b N N D P C te P B	ampling, quan neasurements, I mage Operation attribution technic mage Transfor leed of transfor mage Enhance oint operations mage Segment lassification of echniques, Regi attern Recogn asic concepts	Data structure for im ons and Interpolation ations, Logical opera- hniques mation mation, DFT and pr ment ,Spatial filtering tect ation of Image segmenta- on growing techniq- ition Fundamental of pattern recogn	age representation ons ations, Geometrical operties, convolutio chniques, Frequency ation, Edge detec ues s ition, fundamental	operations , Image on Theorem, DCT y domain filtering ction, Thresholding problems in pattern	7 6 6 7		
III IV	m b A ir b N D P b C C te P B r c	ampling, quan measurements, I mage Operation attribution technic mage Transfor feed of transfor mage Enhance oint operations mage Segment classification of echniques, Regination asic concepts ecognition systemet	Data structure for im ons and Interpolation ations, Logical opera- hniques mation mation, DFT and pr ment ,Spatial filtering tec ation of Image segments on growing techniq ition Fundamental of pattern recogn tem, design conc	age representation ons ations, Geometrical operties, convolution chniques, Frequency ation, Edge detectues s ition, fundamental epts and method	operations , Image on Theorem, DCT y domain filtering ction, Thresholding problems in pattern ologies, example of	7 6 6 7		
III IV V	m b A ir b N b P b C C te P B B c e a	ampling, quan measurements, I mage Operation rithmetic opera- interpolation tect mage Transfor Mage Transfor mage Enhance oint operations mage Segment lassification of chniques, Regi attern Recogn asic concepts ecognition sys- utomatic pattern	Data structure for im ons and Interpolation ations, Logical opera- hniques mation mation, DFT and pr ment ,Spatial filtering tec ation of Image segments on growing techniq ition Fundamental of pattern recogn tem, design conc	age representation ons ations, Geometrical operties, convolution chniques, Frequency ation, Edge detectues s ition, fundamental epts and method	operations , Image on Theorem, DCT y domain filtering ction, Thresholding problems in pattern	7 6 6 7		
III IV V	m b A ir b N b P b C C te P B B c e a	ampling, quan measurements, I mage Operation attribution technic mage Transfor feed of transfor mage Enhance oint operations mage Segment classification of echniques, Regination asic concepts ecognition systemet	Data structure for im ons and Interpolation ations, Logical opera- hniques mation mation, DFT and pr ment ,Spatial filtering tec ation of Image segments on growing techniq ition Fundamental of pattern recogn tem, design conc	age representation ons ations, Geometrical operties, convolution chniques, Frequency ation, Edge detectues s ition, fundamental epts and method	operations , Image on Theorem, DCT y domain filtering ction, Thresholding problems in pattern ologies, example of	7 6 6 7		
III IV V	m b A ir b N b P b C C te P B B c e a	ampling, quan measurements, I mage Operation rithmetic opera- interpolation tect mage Transfor Mage Transfor mage Enhance oint operations mage Segment lassification of chniques, Regi attern Recogn asic concepts ecognition sys- utomatic pattern	Data structure for im ons and Interpolation ations, Logical opera- hniques mation, DFT and pr ment ,Spatial filtering technique of Image segments on growing technique ition Fundamental of pattern recognitern tem, design conconnection system	age representation ons ations, Geometrical operties, convolution chniques, Frequency ation, Edge detectues s ition, fundamental epts and method ns, a simple automa	operations , Image on Theorem, DCT y domain filtering ction, Thresholding problems in pattern ologies, example of	7 6 6 7		
III IV V	m Lu A ir Lu N Lu P Lu C tee P B ree au m	ampling, quan measurements, I mage Operation atterpolation techniques, <b>Enhance</b> oint operations mage Segment lassification of echniques, Regination system asic concepts ecognition system attern mage Segment attern Recognation system attern mage Segment attern Recognation system attern mage Segment system attern Recognation system attern mage Segment system attern mage	Data structure for im ons and Interpolation ations, Logical opera- hniques mation, DFT and primetion ment "Spatial filtering technique of Image segments on growing technique ition Fundamental of pattern recognition system tem, design concounter n recognition system	age representation ons ations, Geometrical operties, convolution chniques, Frequency ation, Edge detectues s ition, fundamental epts and method ns, a simple automa	operations , Image on Theorem, DCT y domain filtering ction, Thresholding problems in pattern ologies, example of tic pattern recognition	7 6 6 7 7 6		
III IV V	m h A ir h N h P h C te P B r e au m	ampling, quan measurements, I mage Operation rithmetic opera- interpolation techniques mage Transfor mage Transfor mage Transfor mage Enhance oint operations mage Segment classification of echniques, Regination asic concepts ecognition sys- utomatic pattern model	Data structure for im ms and Interpolation ations, Logical opera- hniques mation, DFT and pr ment "Spatial filtering tect ation of Image segments on growing techniq ition Fundamental of pattern recognitem, design conc n recognition system <i>Image Processing</i>	age representation ons ations, Geometrical operties, convolution chniques, Frequency ation, Edge detectues s ition, fundamental epts and method ns, a simple automa <b>Text Books</b> ', Oxford Unversity	operations , Image on Theorem, DCT y domain filtering ction, Thresholding problems in pattern ologies, example of	7 6 6 7 6 6		

	References						
1	S. Jayraman, S Esakkiarajan, Veerakumar, "Digital image processing", 1 <sup>st</sup> Edition, MGH, 2017.						
2	Rafel C. Gonzalez, Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson						
	<sup>2</sup> 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						
	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.

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.

Assessment Plan based on Bloom's Taxonomy Level							
<b>Bloom's Taxonomy Level</b>	MSE	ISE	ESE	Total			
Remember	To be used minimum						
Understand	To be used minimum						
Apply	10	10	20	40			
Analyze	10	5	10	25			
Evaluate	10	5	10	25			
Create			10	10			
Total	30	20	50	100			

			ollege of Engine	0. 0				
		(Government	A A A A A A A A A A A A A A A A A A A	ous Institute)				
		C	AY 2022-23 ourse Information					
Drogram	mmo			n				
	Programme     M.Tech. (CS and IT)       Class, Semester     First Year M. Tech., Sem I							
Class, S Course		6IT553	reen., sem r					
Course			ective – 1-Cloud :	and Virtualization	Technique	s Lab		
	Requisites:	Computer Netw			reeninque	3 Lab		
Desireu	Requisites.	Computer riterw	UIK5					
Теа	ching Scheme		Examinat	tion Scheme (Mar	·ks)			
Lecture	Y	LA1	LA2	ESE		Total		
Tutoria		30	30	40		100		
Practica				· · ·				
Interact				Credits: 1				
	1							
		С	ourse Objective	S				
1	To introduce fundat							
2	To impart various s	ervice and deploy	ment model in cl	oud computing				
3	To acquaint the sign	nificance of virtua	lization in data c	enter				
	Co	urse Outcomes (	CO) with Bloom	's Taxonomy Lev	el			
At the e	nd of the course, the	e students will be	able to,					
CO1	Demonstrate the fun	ndamentals of clo	ud services using	public cloud		Understand		
CO2	Choose virtualization	on techniques to d	eploy the service	on cloud infrastru	cture	Apply		
CO3	Analyze service mo	dels for data cent	er applications us	sing open source to	ool	Analyze		
	Experiments:							
	Create a Virtual ma	chine using VMw	are on linux and	analyze the perfor	mance of V	/M for loaded		
	conditions			. ~	_			
	Implement a Docke			ine. Give performation	ance analys	515		
	Use AWS public clo							
	Implement kuberne			COSS Commons th	a factura a	f Onan staal		
	Demonstrate and im			ross. Compare m	e leature o	I Open stack		
	cloud with enterpris	e based public clo	Text Books					
	Rajkumar Buyya,	Christian Vecchi		Selvi "Masteriv	o cloud c	omputing" Me		
<b>I</b> 1	Graw Hill Educatio			1 501 v1, <i>W1USICI III</i>		<i>imputing</i> , <b>MC</b>		
	Thomas Erl, Zaigha	, ,		. "Cloud Computi	ng: Conce	pts. Technology		
/	& Architecture", Pe			, cicia compan		, icennology		
I			,					
			References					
1	Richardo Puttini,	Thomas Erl, a		Iahmood, "Cloud	d Comput	ing: Concepts.		
1	Technology & Arch		÷		1	<i>C 1 i</i>		
2	Srinivasan, J. Su				oach for	learning and		
2	implementation", P	earson, 2nd Edition	on, 2012					
·								
			<b>Useful Links</b>					
	Module: I, II, IV, V							
1	https://nptel.ac.in/co	ontent/syllabus_p	df/106105167.pd	f				
2	https://aws.amazon.	.com/						

CO-PO Mapping								
Programme Outcomes (PO)								
	PO1	PO2	PO3	PO4	PO5	PO6		
CO1	3		3					
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	50
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	20
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.

Assessment Plan based on Bloom's Taxonomy Level							
<b>Bloom's Taxonomy Level</b>	LA1	LA2	Lab ESE	Total			
Remember	To be used minimum						
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum			
Apply	10	10	10	30			
Analyze	10	10	10	30			
Evaluate	5	5	10	20			
Create	5	5	10	20			
Total	30	30	40	100			

				ollege of Engineeri			
			(Government	Aided Autonomous	Institute)		
			Co	urse Information			
Progra	amme		M.Tech. (CS ar				
Class,			First Year M. To				
Cours	e Cod	e	6IT554				
Cours	e Nan	ie	Professional El	ective – 1- Ruby &	Go Program	ming Language	e Lab
Desire	d Req	uisites:	C & CPP Progra	amming			
Те	eachin	g Scheme		Examinatio	n Scheme (M	larks)	
Lecture	<b>)</b>	-	LA1	LA2	ESI	E	Total
Futoria	l	-	30	30	40		100
Practic	al	2 Hrs/week					
Interac	tion	-					
		-		С	redits: 1	I	
		·	·				
				ourse Objectives			
1		·		o Programming La	0 0		
2				ndling and error ha			
3	To e			for process synchro			
A 1	1			CO) with Bloom's	Taxonomy L	level	
At the	end of	t the course, the	students will be a	able to,	T		
CO		C	ourse Outcome S	Statement/s		Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Appl	v object oriente	d programming c	oncepts using Ruby	1	III	Applying
CO2		ement the conce		ng using Ruby and		III	Applying
CO3	-	ose the solution	for Synchronizat	ion problem using	Go	VI	Creating
			Ma	dule Contents			
	T	ntraduction to	Ruby Programn				
	B F C	rief history of l low Control & Conditionals, Lo	Ruby, Installing & <b>Statements and</b> ops, Error & Exce	running Ruby, Co	nreads & Fibe	ers	
	N	leta-programm		<b>dling:</b> Types, Modules & C	Classes, Bloc	ks & Strings	
	lı ty	pes, files, scop	ogram Structure: e, number, string	names, declaratio variables, arrays, sl		, assignments,	
	B	Data Types and Basic data types, Interface, pointer	composite data t	ypes, functions, cor	ntrol statemen	ts, methods,	
	C R		i <b>th Shared varia</b> l		ory sy	nchronization,	
	P			Text Books			1
1			xihiro Mataumoto 1 de 43n noi ide ta	, "The Ruby Progra	umming Lang	uage: Everythi	ng You Need
2	Alan	A. A. Donovar		ghan, "The Go Pro	gramming La	nguage", 4yleo	oi

	References						
1	Yukihiro Matsumoto, David Flanagan, " <i>The Ruby Programming Language</i> ", Shroff,1 <sup>st</sup> Edition, 2008.						
2	2 Caleb Doxsey, " <i>An Introduction to Programming in Go</i> ", 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								
	Programme Outcomes (PO)							
	PO1 PO2 PO3 PO4 PO5 PO6							
CO1	2			2				
CO2		2			3	1		
CO3	1		3		3			

L	passing. LA1, LA	LA2 and Lab ESE. A2 together is treated as In-Semester Evaluation	on.
•		A2 together is treated as In-Semester Evaluation	on.
Based on	$\alpha$ $1$ $(1)$		
Dubta OII	Conducted by	Typical Schedule	Marks
Lab activities,	Lab Course	During Week 1 to Week 6	30
tendance, journal	Faculty	Marks Submission at the end of Week 6	50
Lab activities,	Lab Course	During Week 7 to Week 12	30
tendance, journal	Faculty	Marks Submission at the end of Week 12	50
Lab activities,	Lab Course	During Week 13	40
tendance, journal	Faculty	Marks Submission at the end of Week 13	40
	Lab activities, endance, journal Lab activities, endance, journal Lab activities,	Lab activities, endance, journalLab Course FacultyLab activities, endance, journalLab Course FacultyLab activities, endance, journalLab Course FacultyLab activities, endance, journalLab Course Faculty	Lab activities, endance, journalLab Course FacultyDuring Week 1 to Week 6 Marks Submission at the end of Week 6Lab activities, endance, journalLab Course FacultyDuring Week 7 to Week 12 Marks Submission at the end of Week 12Lab activities, endance, journalLab Course FacultyDuring Week 13 Marks Submission at the end of Week 13

Assessment Plan based on Bloom's Taxonomy Level								
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total				
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Apply	10	10	10	30				
Analyze	10	10	10	30				
Evaluate	5	5	10	20				
Create	5	5	10	20				
Total	30	30	40	100				

			(Government A	AY 2023-24						
				rse Information						
Progr	amme		M.Tech. (CS and							
	Semes	stor	First Year M. Tec	·						
,	se Cod		6IT555							
	se Nam			tive – 1-Artificial I	ntelligence Lah					
		uisites:	Probability and L		interingence Lab					
Desire	u neg	uisites.		inear Aigeora						
Т	eachin	g Scheme		Examination S	cheme (Marks)					
Lectu		-	LA1	LA2	Lab ESE	Total				
Tutor		-	30	30	40	100				
Practi		2 Hrs/Week				100				
Intera		-		Cre	dits: 1					
			Cou	rse Objectives						
1	Toc	ompare variou	is techniques in A	<u> </u>	ice					
2			odologies for vari			ntelligence				
$\frac{2}{3}$			is applications in	11						
5	101		rse Outcomes (CC							
At the	and of		students will be ab	/	axonomy Level					
$\frac{At the}{CO1}$			e concept of Artific			Understand				
			•	•						
CO2	-				earch algorithms of artificial intelligence. Apply					
<u>CO3</u>	CO3 To apply knowledge representation and reasoning techniques. Apply									
	1		•	and reasoning te	•	Apply				
Activi	f Expendition for the second sec	riments: re to be carried	List of Expendent	riments / Lab Acti	vities	Apply				
Activi	f Expendition for the second sec	riments: re to be carried	List of Expe	riments / Lab Acti	vities	Apply				
Activi Each	<b>f Expe</b> ities ar studen	riments: re to be carried	List of Expendent	riments / Lab Acti	vities	Course				
Activi Each Exp.	<b>f Expe</b> ities ar studen	riments: re to be carried t will perform	List of Expendent	riments / Lab Acti	vities					
Activi Each Exp. No. 1	f Experiities ar studen Exper	riments: re to be carried t will perform iment Name	List of Expendent	riments / Lab Acti	vities	Course				
Activi Each Exp. No. 1 2	f Expe ities ar studen Exper Write	riments: re to be carried t will perform iment Name a program in P	<b>List of Expe</b> d out individually. the activity based	riments / Lab Acti	vities lowing areas. ts and Queries	Course Outcome				
Activi Each Exp. No. 1 2 3	f Experities ar studen Exper Write Write Write	riments: re to be carried t will perform iment Name a program in P a program in P a program in P	List of Expendent d out individually. the activity based bython/Prolog to im bython/Prolog to im bython/Prolog to sol	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana	vities lowing areas. ts and Queries hmetic problem	Course Outcome CO1				
Activities Each and Exp. No. 1 2 3 4	f Experities ar studen Exper Write Write Write	riments: re to be carried t will perform iment Name a program in P a program in P a program in P	List of Expendent d out individually the activity based bython/Prolog to im ython/Prolog to im	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana	vities lowing areas. ts and Queries hmetic problem	Course Outcome CO1 CO1				
Activities Each and a second s	f Exper ities ar studen Exper Write Write Write Write	riments: re to be carried t will perform iment Name a program in P a program in P a program in P a program in P	List of Expendent d out individually. the activity based bython/Prolog to im bython/Prolog to im bython/Prolog to sol	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana ve Tower of Hanoi	vities lowing areas. ts and Queries hmetic problem	Course Outcome CO1 CO1 CO1 CO1				
Activi Each Exp. No. 1 2 3 4 5 6	f Exper ities ar studen Exper Write Write Write Write Write	riments: re to be carried t will perform iment Name a program in P a program to It	List of Expendent List of Expendent d out individually. the activity based bython/Prolog to im ython/Prolog to im ython/Prolog to sol	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana ve Tower of Hanoi ig problem using P	vities lowing areas. ts and Queries hmetic problem	Course Outcome CO1 CO1 CO1 CO1 CO1 CO2				
Activi Each Exp. No. 1 2 3 4 5 6 7	f Exper ities ar studen Exper Write Write Write Write Write	riments: re to be carried t will perform iment Name a program in P a program to It a program to It a program in P	List of Expendent List of Expe	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana ve Tower of Hanoi ug problem using P ve 8 Puzzle problem	vities lowing areas. ts and Queries hmetic problem ython/Prolog ms	Course Outcome CO1 CO1 CO1 CO2 CO2				
Activi Each No. 1 2 3 4 5 6 7 8	f Exper ities ar studen Exper Write Write Write Write Write Write	riments: re to be carried t will perform iment Name a program in P a program in P a program in P a program in P a program to In a program to In a program in P a program in P	List of Expendent List of Expendent d out individually. the activity based by thon/Prolog to im by thon/Prolog to sol by thon/Prolog to sol cython/Prolog to sol public to sol cython/Prolog to sol cython/Prolog to sol	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana ve Tower of Hanoi g problem using P ve 8 Puzzle proble ve 4-Queens proble	vities lowing areas. ts and Queries hmetic problem ython/Prolog ms em	Course Outcome CO1 CO1 CO1 CO2 CO2 CO2 CO2				
Activi Each No. 1 2 3 4 5 6 7 8	f Exper ities ar studen Exper Write Write Write Write Write Write Write	riments: re to be carried t will perform iment Name a program in P a program in P a program in P a program to In a program in P a program in P a program in P a program in P a program in P	List of Expen- List of Expen- d out individually. the activity based ython/Prolog to im ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana ve Tower of Hanoi ig problem using P ve 8 Puzzle proble ve 4-Queens proble ries-Cannibals Pro	vities lowing areas. ts and Queries hmetic problem ython/Prolog ms em blems using	Course Outcome CO1 CO1 CO1 CO2 CO2 CO2 CO2 CO2 CO2				
Activi Each Exp. No. 1 2 3 4 5 6 7 8 9	f Exper ities ar studen Exper Write Write Write Write Write Write Write Write	riments: re to be carried t will perform iment Name a program in P a program in P a program in P a program to In a program to In a program in P a program to In a program in P a program to In a program to In	List of Expen- List of Expen- d out individually. the activity based tython/Prolog to im bython/Prolog to sol ython/Prolog to sol mplement Water-Ju bython/Prolog to sol ython/Prolog to sol ython/Prolog to sol python/Prolog to sol	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana ve Tower of Hanoi g problem using P ve 8 Puzzle proble ve 4-Queens proble ries-Cannibals Pro ve Traveling sales	vities lowing areas. ts and Queries hmetic problem ython/Prolog ms em blems using	Course Outcome CO1 CO1 CO1 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2				
Activi Each No. 1 2 3 4 5 6 7 8 9 10 Stude and s	f Exper ities ar studen Exper Write Write Write Write Write Write Write Write Write Write It sho ubmit	riments: re to be carried t will perform iment Name <u>a program in P</u> <u>a program in P</u> <u>a program in P</u> <u>a program in P</u> <u>a program to In</u> <u>a program to In</u>	List of Exper d out individually. the activity based ython/Prolog to im ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol plement Missiona ython/Prolog to sol nplement a Tic-Tac he activities on t h code, PPT, PD hould maintain ac	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana ve Tower of Hanoi ig problem using P ve 8 Puzzle problem ve 4-Queens problem ve 4-Queens problem ve 5-Cannibals Pro ve Traveling sales c-Toe game. he basis of the ref F, Text report do ctivity log book co	vities lowing areas. ts and Queries hmetic problem ython/Prolog ms em blems using nan problem cal-time application cument & refere	Course Outcome CO1 CO1 CO2 CO2 CO2 CO2 CO2 CO2 CO3 CO3 CO3 CO3 CO3 CO3				
Activi Each Exp. No. 1 2 3 4 5 6 7 8 9 10 Stude and s	f Exper ities ar studen Exper Write Write Write Write Write Write Write Write Write It sho ubmit	riments: re to be carried t will perform iment Name a program in P a program in P a program in P a program to In a program to	List of Exper d out individually. the activity based ython/Prolog to im ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol ython/Prolog to sol plement Missiona ython/Prolog to sol nplement a Tic-Tac he activities on t h code, PPT, PD hould maintain ac	riments / Lab Acti d on course on fol plement simple fac plement simple arit ve Monkey banana ve Tower of Hanoi ig problem using P ve 8 Puzzle proble ve 4-Queens proble ries-Cannibals Pro ve Traveling sales c-Toe game. he basis of the re F, Text report do ctivity log book co <b>Text Books</b>	vities lowing areas. ts and Queries hmetic problem ython/Prolog ms em blems using nan problem eal-time application cument & refere pontaining weekly	Course Outcome CO1 CO1 CO2 CO2 CO2 CO2 CO2 CO2 CO3 CO3 CO3 CO3 CO3 CO3 CO3				

2 Ivan Bratko, *"Prolog Programming for Artificial Intelligence Pearson Education India*, 3rd Edition, 2009.

1

## **Useful Links**

https://nptel.ac.in/courses/106105077 (NPTEL/SWAYAM course by Prof. Anupam Basu Department of CS and ITIIT Kharagpur Prof. S. Sarkar Department of CS and ITIIT Kharagpur)

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

#### 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	50
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30
	attendance, journal	Faculty	Marks Submission at the end of Week 12	50
Lab ESE	Lab activities,	Lab Course	During Week 13	40
Lau ESE	attendance, journal	Faculty	Marks Submission at the end of Week 13	40

Attendance, journalFacultyMarks Submission at the end of Week 13Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing<br/>experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the<br/>nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and<br/>related activities if any.

Assessment Plan based on Bloom's Taxonomy level							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum			
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum			
Apply	10	10	10	30			
Analyze	10	10	10	30			
Evaluate	5	5	10	20			
Create	5	5	10	20			
Total	30	30	40	100			

				ge of Engineering, S		
			1	led Autonomous Inst <b>Y 2022-23</b>	itute)	
				e Information		
Progra	mme		M.Tech. (CS and			
Class,		ter	First Year M. Tec			
Course Code 6IT556						
Course Name         Professional Elective – 2- Advanced Distributed Computing lab						
Desire		*				
2 0011 0			1			
Т	eachin	g Scheme		Examination Sch	eme (Marks)	
Lectur		3 Hrs/week	MSE	ISE	ESE	Total
Tutori	al	-	30	20	5	100
Practio	cal	-		11	I	
Intera	ction	-		Credi	ts: 3	
			1			
			Cour	se Objectives		
1	To de	monstrate the v		odern distributed sys	stems	
2	To im	plement frame	works of distributed	l architecture		
3	To an		nd distributed comp			
				with Bloom's Taxe	onomy Level	
			students will be able			
CO1			g data analytics tec	-		Analyze
CO2			distributed System			Analyze
CO3	Evalu syster		ty and performance	of various algorithm	as of distributed	Evaluate
			Lab activiti	es/Experiments		
	N	<ol> <li>Write a program.</li> <li>Implementation</li> <li>Use distribution</li> <li>Write a program.</li> <li>Develop at the program.</li> <li>Implementation</li> <li>Implementation</li> <li>Implementation</li> <li>Word a large</li> </ol>	ogram that commun t Arithmetic Service buted data processin t parallelism. ogram to Trace Com n application using t a word count appli ge collection of doc	g frameworks and n nmunication protoco a technology from d cation which counts uments Using Map	wo hosts d, and subtract opera obile application to als in distributed syst istributed system. the number of occur	ol kits to ems. rrences of each
1	Andre	ew S. Tanenbau		<b>ext Books</b> 1 Steen, "Distributed	Systems: Principles	and
1	Parad	<i>digms</i> ", 2 <sup>nd</sup> edit	ion, Pearson Educat	ion, 2007.	ted Systems: Concep	
2			, Pearson Education			
	. ~	<b>T</b> 1		eferences	· · 1 · 1 · · ·	
1		Tanenbaum and on, Prentice Hal		tributed Systems: Pr	inciples and Paradig	gms", Second
			Us	eful Links		

	Module I, II, III, IV
	https://www.coursera.org/learn/parallel-programming-in-java?specialization=pcdp#syllabus
1	Module V, VI
	https://www.coursera.org/learn/distributed-programming-in-java?specialization=pcdp#syllabus

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

Assessment								
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab ES	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	50				
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30				
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
Lob ESE	Lab activities,	Lab Course	During Week 13	40				
Lab ESE	attendance, journal	Faculty	Marks Submission at the end of Week 13	40				

Assessment Plan based on Bloom's Taxonomy Level						
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Apply	10	10	10	30		
Analyze	10	10	10	30		
Evaluate	5	5	10	20		
Create	5	5	10	20		
Total	30	30	40	100		

				(Governme	ent Aided Auton	· · · · · · · · · · · · · · · · · · ·		
					AY 2022-2.	3		
				(	<b>Course Inform</b>	ation		
Prog	rami	me	M.	Tech. (CS a	and IT)			
Class	s, Sei	mester	Fir	st Year M.	Гесh., Sem I			
Cour	se C	ode	6ľ	Г557				
Cour	se N	ame	Pro	ofessional E	lective – 2- Mod	lern Application	Development	Lab
Desir	ed R	Requisites:	Ob	ject oriente	d programming	concepts, Java H	Programming	
		1	I	5	1 0 0	1	0 0	
Т	each	ing Scheme			Exan	nination Schem	e (Marks)	
				LA1	LA2	ESE	. ,	otal
utori		-		30	30	40		100
racti		2 Hrs/week						
ntera	ctior	n   -						
						Credits	s 1	
		1						
					Course Object	tives		
1	To	introduce the and	droid	l architectur	e and tools for c	leveloping And	oid applications	5
2	To	impart current cl	ient	side and ser	ver side web tee	chnologies on A	ndroid platform	l
3	To	provide user inte			<u> </u>			
					(CO) with Blo	om's Taxonom	y Level	
At the	e enc	l of the course, the	e stu	dents will b	e able to,			
~~~							Bloom's	
СО		C	our	se Outcome	e Statement/s		TaxonomyTaxonLevelDescrit	
		1 D 1 1 110		es of Activi	as of Activities			DescriptionApplying
	1	Describe the life	CVC	nponents of Android API to develop their			III	Apprying
CO		Describe the life				velon their		Analysing
		Use the major co				velop their	IV	Analysing
CO	2	Use the major co own apps	ompo	onents of An	droid API to de		IV	
CO CO	2	Use the major co	ompo	onents of An	droid API to de			Analysing Creating
CO CO	2	Use the major co own apps Deploy application distribution.	ompo	onents of An	droid API to de vid marketplace <b>Textbooks</b>	for	IV	
CO CO CO	2	Use the major co own apps Deploy application distribution. Beginning Andre	ompo ons t	onents of An to the Andro application of	droid API to de vid marketplace <b>Textbooks</b> development by	for Wei-Mag Lee	IV VI	
CO CO CO 1 2	2	Use the major co own apps Deploy application distribution. Beginning Andro Learning Andro	ompo ons t oid a id by	onents of An to the Andro application of Marko Gar	droid API to de oid marketplace <b>Textbooks</b> development by rgenta Publisher	for Wei-Mag Lee : O'Reilly Medi	IV VI a	
CO CO CO	2	Use the major co own apps Deploy application distribution. Beginning Andre	ompo ons t oid a id by	onents of An to the Andro application of Marko Gar	droid API to de vid marketplace <b>Textbooks</b> development by rgenta Publisher inners by Walla	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E	IV VI a	
CO CO CO 1 2 3	2	Use the major co own apps Deploy application distribution. Beginning Androi Learning Androi Android Apps fo	ompo ons t oid a id by or Al	application of Marko Gar	droid API to de oid marketplace <b>Textbooks</b> development by rgenta Publisher inners by Walla <b>Reference</b>	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E	IV VI a Edition	Creating
CO CO CO 1 2 3 1	2	Use the major co own apps Deploy application distribution. Beginning Andro Learning Andro Android Apps for Reto Meier Publication	ons to oid a id by or Al	application of Marko Gar bsolute Beg	droid API to de oid marketplace <b>Textbooks</b> levelopment by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E s pplication Deve	IV VI a Edition	Creating
CO CO CO 1 2 3 1 2 2	2	Use the major co own apps Deploy application distribution. Beginning Andro Learning Andro Android Apps for Reto Meier Publ Android in Action	ons t oid a id by or Al lishe	application of Marko Gar bsolute Beg r, Profession	droid API to de oid marketplace <b>Textbooks</b> development by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A W.Frank Ables	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E s pplication Deve son,Robi Sen, C	IV VI a Edition elopment  Wiley hris King, C. Er	Creating / India nrique Ortiz
CO CO CO 1 2 3 1	2	Use the major co own apps Deploy application distribution. Beginning Androi Android Apps for Reto Meier Publ Android in Action The Android De	ons t oid a id by or Al lishe	application of Marko Gar bsolute Beg r, Profession	droid API to de oid marketplace <b>Textbooks</b> development by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A W.Frank Ables	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E s pplication Deve son,Robi Sen, C	IV VI a Edition elopment  Wiley hris King, C. Er	Creating 7 India nrique Ortiz
CO CO CO 1 2 3 1 2 2	2	Use the major co own apps Deploy application distribution. Beginning Andro Learning Andro Android Apps for Reto Meier Publ Android in Action	ons t oid a id by or Al lishe	application of Marko Gar bsolute Beg r, Profession	droid API to de oid marketplace <b>Textbooks</b> development by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A W.Frank Ables	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E s pplication Deve son,Robi Sen, C	IV VI a Edition elopment  Wiley hris King, C. Er	Creating / India nrique Ortiz
CO CO CO 1 2 3 1 2 2	2	Use the major co own apps Deploy application distribution. Beginning Androi Android Apps for Reto Meier Publ Android in Action The Android De	ons t oid a id by or Al lishe	application of Marko Gar bsolute Beg r, Profession	droid API to de oid marketplace <b>Textbooks</b> development by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A W.Frank Ables book <i>"Building</i>	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E pplication Deve con,Robi Sen, C <i>Applications wi</i>	IV VI a Edition elopment  Wiley hris King, C. Er	Creating / India nrique Ortiz
CO CO CO 1 2 3 3 3	2	Use the major co own apps Deploy application distribution. Beginning Androi Learning Androi Android Apps for Reto Meier Publ Android in Action The Android De Steele	oid a id by or Al lishe	application of Marko Gar bsolute Beg r, Profession hird Edition per's Cook	droid API to de oid marketplace <b>Textbooks</b> levelopment by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A W.Frank Ables book <i>"Building</i>	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E pplication Deve con,Robi Sen, C <i>Applications wi</i>	IV VI a Edition elopment  Wiley hris King, C. Er	Creating / India nrique Ortiz
CO CO CO 1 2 3 1 2 3 3	2	Use the major co own apps Deploy application distribution. Beginning Andro Learning Andro Android Apps for Reto Meier Publ Android in Action The Android De Steele	oid a oid a id by or Al lishe on T vvelo	application of Analysis of Analysis application of Marko Gau bsolute Beg r,  Profession hird Edition per's Cook	droid API to de id marketplace <b>Textbooks</b> levelopment by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A W.Frank Ables book <i>"Building</i> Useful Link uide	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E pplication Deve son,Robi Sen, C <i>Applications wa</i>	IV VI a Edition elopment  Wiley hris King, C. Er	Creating / India nrique Ortiz
CO CO CO 1 2 3 1 2 3	2	Use the major co own apps Deploy application distribution. Beginning Androi Learning Androi Android Apps for Reto Meier Publi Android in Action The Android De Steele	oid a oid a id by or Al lishe on T vvelo	application of Amplication of Marko Gar bsolute Beg r, IProfession hird Edition per's Cook Iroid.com/gontral.com/co	droid API to de bid marketplace <b>Textbooks</b> levelopment by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A W.Frank Ables book <i>"Building</i> <b>Useful Link</b> nide urse/androidpar	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E s pplication Deve son,Robi Sen, C <i>Applications wa</i> ss	IV VI a Edition elopment  Wiley hris King, C. Er	Creating / India nrique Ortiz
CO CO CO 1 1 2 3 1 2 3 1 2 3	2	Use the major co own apps Deploy application distribution. Beginning Andro Learning Andro Android Apps for Reto Meier Publ Android in Action The Android De Steele	ons t oid a id by or Al lishe con T vvelo	application of Amplication of Marko Gar bsolute Beg r, IProfession hird Edition per's Cook Iroid.com/gu ntral.com/co com/topic/a	droid API to de id marketplace <b>Textbooks</b> development by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A W.Frank Ables book <i>"Building</i> Useful Link nide urse/androidpar ndroid-developn	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E s pplication Deve son,Robi Sen, C <i>Applications wa</i> ss	IV VI a Edition elopment  Wiley hris King, C. Er	Creating / India nrique Ortiz
CO CO CO 1 1 2 3 1 2 3 1 2 3	2	Use the major co own apps Deploy application distribution. Beginning Androi Android Apps for Android Apps for Reto Meier Publ Android in Action The Android De Steele https://developer https://www.class https://www.ude	ons t oid a id by or Al lishe con T vvelo	application of Amplication of Marko Gar bsolute Beg r, IProfession hird Edition per's Cook Iroid.com/gu ntral.com/co com/topic/a	droid API to de id marketplace <b>Textbooks</b> development by rgenta Publisher inners by Walla <b>References</b> nal Android 4 A W.Frank Ables book <i>"Building</i> Useful Link nide urse/androidpar ndroid-developn	for Wei-Mag Lee : O'Reilly Medi ce Jackson 2 <sup>nd</sup> E s pplication Deve son,Robi Sen, C <i>Applications wa</i> ss	IV VI a Edition elopment  Wiley hris King, C. Er	Creating / India nrique Ortiz

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

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.							
Based on	Conducted by	Typical Schedule	Marks				
Lab activities,	Lab Course	During Week 1 to Week 6	30				
attendance, journal	Faculty	Marks Submission at the end of Week 6	50				
Lab activities,	Lab Course	During Week 7 to Week 12	30				
attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
Lab activities,	Lab Course	During Week 13	40				
attendance, journal	Faculty	Marks Submission at the end of Week 13	40				
	E is a separate head of Based on Lab activities, attendance, journal Lab activities, attendance, journal Lab activities,	ee components of lab assessment, LA1, E is a separate head of passing. LA1, LABased onConducted byLab activities, attendance, journalLab Course FacultyLab activities, Lab CourseLab Course	ee components of lab assessment, LA1, LA2 and Lab ESE.E is a separate head of passing. LA1, LA2 together is treated as In-Semester EvaluateBased onConducted byTypical ScheduleLab activities,Lab CourseDuring Week 1 to Week 6attendance, journalFacultyMarks Submission at the end of Week 6Lab activities,Lab CourseDuring Week 7 to Week 12attendance, journalFacultyMarks Submission at the end of Week 12Lab activities,Lab CourseDuring Week 7 to Week 12Lab activities,Lab CourseDuring Week 13				

Assessment Plan based on Bloom's Taxonomy Level							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum			
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum			
Apply	10	10	10	30			
Analyze	10	10	10	30			
Evaluate	5	5	10	20			
Create	5	5	10	20			
Total	30	30	40	100			

			llege of Engineerin		
		(Government)	Aided Autonomous I	nstitute)	
		Car	AY 2022-23		
Progra	mme	M.Tech. (CS and	Irse Information		
	Semester	First Year M. Te			
Course		6IT558			
	e Name		ive – 2- Image Proc	essing and Pattern Rec	ognition Lab
	d Requisites:		and Pattern Recogn	*	- 0
	-		trix, Fourier Transfo		
		1			
	aching Scheme			Scheme (Marks)	
Lectur		LA1	LA2	ESE	Total
Tutoria		30	30	40	100
Practic Interac				edits: 1	
Interac					
		Co	urse Objectives		
	Introduce foundation			analysis techniques. to	solve image
1		s of real world appli		5 1	C
2				now to use other classif	
3		ssing and pattern rec	cognition techniques	to detect objects and	activities in
	images and video				
4		hon scripts to apply			
A ( 11 -		ourse Outcomes (C		axonomy Level	
CO1	end of the course, th	nhancement techniq		20	Applying
CO1 CO2		ent segmentation tech			Applying Analyze
CO2 CO3		age operations and n		tions	Creating
000		age operations and h	norphological opera		creating
List of	Experiments:				
	Program to perform	digital negative of	an image		
2.			of an image and (b)	Enhance image using	Histogram
-	equalization.				
3.	Program to introdu		· · · · · · · · · · · · · · · · · · ·		
		find contrast stretch perform bit plane sl			
4.		Rotation, Scaling &	0	ion on an image	
 5.		ge using LOG and D		ion on an mage	
6.		ent Morphological o		ge	
7.	Program to perform	Huffman Coding of	n an Image		
	Program to perform			g	
9.	Develop mini proje	ct in image processi	ng		
			Tout Dealer		
	Millan sonka Vaal	av Hiavac Roger P	Text Books	ssing Analysis and Ma	chine Vision" 3rd
1	Edition, CL Engine	•	byte, image ribees	ssing Analysis and Ma	clinic vision, sid
2	Rafel C. Gonzalez, 2008	Richard E. Woods,	"Digital Image Pro	cessing", 3rd Edition, 1	Pearson Education,
			References		
1	Earl Gose, Richard Hall of India Privat		ttern Recognition ar	nd Image Analysis", 1	st Edition, Prentice
2					

	Useful Links					
1						
2						

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

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			
12/11	attendance, journal	Faculty	Marks Submission at the end of Week 6	50			
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30			
LAL	attendance, journal	Faculty	Marks Submission at the end of Week 12	50			
Lab ESE	Lab activities,	Lab Course	During Week 13	40			
Lau LSE	attendance, journal	Faculty	Marks Submission at the end of Week 13	40			

Assessment Plan based on Bloom's Taxonomy Level				
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember	To be used minimum			
Understand	To be used minimum			
Apply	10	10	10	30
Analyze	10	10	10	30
Evaluate	5	5	10	20
Create	5	5	10	20
Total	30	30	40	100

# SEMESTER -II

			alchand College			
		(		2022-23		
			Course	Information		
Programm	e		M. Tech. (CS a	nd IT)		
Class, Seme	ester		First Year M. T	ech., Sem II		
Course Cod	le		6IT521			
Course Nar	ne		Data Mining M	ethods and App	olications	
Desired Re	quisite	s:	Database Engin	leering	-	
Teachi	ng Sch	eme		Exam	nination Scheme (Marks)	
Lecture		3 Hrs/week	MSE	ISE	ESE	Total
Tutorial		-	30	20	50	100
Practical		-		1	I I	
Interaction		-			Credits: 3	
		I	I			
			Course	e Objectives		
1	Toex	kercise advance	d data mining tec	hniques		
2	Toco	ompare various	algorithm for rea	ll-time applicati	ion	
3	To pr		solution for real			
			Outcomes (CO) v		<b>Taxonomy Level</b>	
			nts will be able to			
<u>CO1</u>			es and algorithms			Apply
CO2 CO3					lving real life problems Jues in data mining	Apply Analyse
005	Allar	yse various clus	stering and classif			Analyse
Module			Mod	ule Contents		Hours
Withuit	T,	ntroduction :	WIOU	ule Contents		110015
Ι	D im T D Si	ata Mining, Ki Data Mining. ypes, Basic Sta ata imilarity and D	Getting to Knov tistical Description	w Your Data:	Technologies, Major Issues Data Objects and Attribute ata Visualization, Measuring	7
II	E ar	nd Data Discret	Data Integration, ization	Data Reduction	n, Data Transformation	6
III	B E	Mining Frequent Patterns:7Basic Concepts, Frequent Item set Mining Methods, Pattern7Evaluation Methods.7				
IV	Classification6Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-6Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy6				6	
V	C C	luster Analysis	5		ical Methods, Density-Based ustering.	7

VI	Outlier DetectionOutliers and Outlier Analysis, Outlier Detection Methods, StatisticalApproaches, Proximity-Based Approaches, Clustering-Based Approaches,Classification-Based Approaches, Mining Contextual and CollectiveOutliers, Outlier Detection in High-Dimensional Data	6
	Text Books	
1	Han Jiawei and Kamber Micheline "Data Mining – Concepts and Techniques" The Kaufmann Series in Data Management Systems ,3 <sup>rd</sup> Edition, 2011	he Morgan
2	Dunham M. H, "Data Mining: Introductory and Advanced topics", Pearson, 2 <sup>nd</sup> E	Edition, 2003
	References	
	Chattamvelli Rajan, " <i>Data Mining Methods: Concepts &amp; Applications</i> ", Narosa I House, 2 <sup>nd</sup> Edition, 2010	Publishing
2	Mitra Sushmita, Acharya Tinku, "Data Mining Multimedia, Soft Computing and WILEY Publication, 3rd Edition, 2003	Biometrics",
	Useful Links	
1	https://onlinecourses.nptel.ac.in/noc20_cs12/preview	
2	https://www.javatpoint.com/data-mining	
3	https://data-flair.training/blogs/data-mining-tutorial/	

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.

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)

Assessm	Assessment Plan based on Bloom's Taxonomy Level				
Bloom's Taxonomy Level	MSE	ISE	ESE	Total	
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Apply	10	10	20	40	
Analyze	10	5	10	25	
Evaluate	10	5	10	25	
Create			10	10	
Total	30	20	50	100	

			(Government Aid						
				Y 2022-23					
D				se Information					
Progra			``````````````````````````````````````	M. Tech. (CS and IT)					
Class, Semester Course Code				First Year M. Tech., Sem II					
Course Course			6IT522 Scientific Comput						
			<b>^</b>	0	T				
Desire	d Reg	uisites:	Programming expe	erience in C, C++,	Java				
Те	achin	g Scheme		Examination	Scheme (Marks)				
Lectur		3Hrs/week	MSE						
Tutori		-	30	20	50	100			
Practic			50	20	50	100			
Intera				Cre	edits: 3				
meru	cuon	1	<u> </u>						
			Cour	rse Objectives					
1	To u	se different prog	gramming paradigms	s in scientific com	puting.				
2	To a	pply appropriate	programming langu	age for solving th	ne problem				
3	To d	emonstrate repo	rt writing using LAT	ΓEX tool.					
			rse Outcomes (CO)		axonomy Level				
		· · ·	students will be able	· · ·					
CO1		<u>^</u>	and logical program			Analyz			
CO2		· · ·	ming language for s			Apply			
CO3	Impl	ement scripts to	automate data form	atting and analysis	8	Apply			
Modu				lule Contents		Hours			
т			Data Science and S	-	8	-			
Ι			e Data Science pro		Computing Technologies,	7			
		ython-Numpy	ssification, Clusterin	lg					
				Numpy array ind	exing, Numpy operations.				
II					groupby, merging &	6			
			perations, data input		groupby, merging &				
		ython for Data	· · · · · ·	und dutu output.					
III		•		ike: Matnlotlib S	eaborn, Plotly and Cufflinks,	6			
		Beographical Plo		ike. Matpiotilo, S	cubolin, i lotty and cultimits,	_			
		Vorking with D	0						
IV				Data frames, Log	gical vectored operators	7			
	I	mage data type,	Image representatio	n, categorical data	using Factors in R				
			ualization using lib						
V					nipulating the plotting	_			
·				tice library in R. I	mage visualization in using	7			
		mage processing	-						
VI			using LaTeX –	<b>X</b> (					
VI	VI LATEX Software installation, LATEX typesetting basics, LATEX math typesetting, Tables and matrices, Mathematics in Latex					6			
	<u> </u>	ypesetting, Table	es and matrices, what						
			Т	ext Books					
1		ir Madhavan, "A 784390150	Mastering Python fo	r Data Science", A	August 2015, Packt Publishin	g, ISBN:			
				References	y-Cambridge Press, 5 <sup>th</sup> Editio				

2	2 Douglas Montgomery, "Applied statistics and probability for engineers", 6 <sup>th</sup> Edition, Wiley Publications, January 2016					
	TT 0 1T • 1					
	Useful Links					
1	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			

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.

Assessment Plan based on Bloom's Taxonomy Level				
<b>Bloom's Taxonomy Level</b>	MSE	ISE	ESE	Total
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum
Apply	10	10	20	40
Analyze	10	5	10	25
Evaluate	10	5	10	25
Create			10	10
Total	30	20	50	100

	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	Course Code 6IT571				
Course Name	Course Name Data Mining Methods and Applications Lab				
Desired Requisites: Data Mining					

Teaching Scheme		Examination Scheme (Marks)				
Lecture	-	LA1 LA2 ESE Total				
Tutorial	-	30	30	40	100	
Practical	2 Hrs/Week			·		
Interaction -			Crea	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,				
<b>CO1</b>	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 &amp; Applications</i> ", Narosa Publishing House, 2 <sup>nd</sup> Edition, 2010

2	2 Mitra Sushmita, Acharya Tinku, "Data Mining Multimedia, Soft Computing and Biometrics", WILEY Publication, 3 <sup>rd</sup> Edition, 2003						
	Useful Links						
1	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	02 1 1						
CO3	3			3			

	Assessment								
	ee components of lab a								
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluation	ion.					
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	50					
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30					
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50					
Lab ESE	Lab activities,	Lab Course	During Week 13	40					
Lab 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.

Assessment Plan based on Bloom's Taxonomy level								
Bloom's Taxonomy Level LA1 LA2 Lab ESE Tot								
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Apply	10	10	10	30				
Analyze	10	10	10	30				
Evaluate	5	5	10	20				
Create	5	5	10	20				
Total	30	30	40	100				

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	6IT572						
Course Name	Course Name Scientific Computing lab						
<b>Desired Requisites:</b>	<b>Desired Requisites:</b> Programming experience in C,C++,Java						

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

	Course Objectives					
1	<b>1</b> 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	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 <sup>th</sup> Edition, Wiley Publications, January 2016						
2	Samir Madhavan, " <i>Mastering Python for Data Science</i> ", August 2015, Packt Publishing, ISBN: 9781784390150						
	References						

1	Gilbert Strang, "Introduction to linear algebra", Wellesley-Cambridge Press, 5 <sup>th</sup> Edition, August 2016						
	Useful Links						
1	https://docs.python.org						
2	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	CO2						
CO3	1	2	2			1	

Assessment								
There are three	ee components of lab a	assessment, LA1,	LA2 and Lab ESE.					
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluat	ion.				
AssessmentBased onConducted byTypical ScheduleMarks								
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	30				
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6					
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30				
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
Lab ESE	Lab activities,	Lab Course	During Week 13	40				
Lab ESEattendance, journalFacultyMarks Submission at the end of Week 13								
Week 1 indic	ates starting week of a	semester. Lab ac	tivities/Lab performance shall include perfor	ming				

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.

Assessment Plan based on Bloom's Taxonomy level								
Bloom's Taxonomy Level LA1 LA2 Lab ESE Total								
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Apply	10	10	10	30				
Analyze	10	10	10	30				
Evaluate	5	5	10	20				
Create	5	5	10	20				
Total	30	30	40	100				

		Walc	0	of Engineering, d Autonomous Institute	0	
				2022-23		
			Course	Information		
Progra	amme		M. Tech. (CS and	d IT)		
Class,	Semester	,	First Year M. Tec	ch., Sem II		
Cours	e Code		6IT573			
Cours	e Name		Pre-dissertation V	Vork and Seminar		
Desire	d Requisi	ites:				
	Teaching			Examination (Marl	ks)	
Practi		4 Hrs/ Week	LA1	LA2	Lab ESE	Tot al
Intera	ction	-	30	30	40	100
				Credit	s: 2	
1	T. D. '			e Objectives		
<u>1</u> 2			students' understar agement of values.	nding of the specific t	opics.	
	1	<b>v</b>	~	nd read such papers cr	ritically and efficie	ntly and to
3				erstanding of a new fi		
4			e value of differen	t contributions and id	entify promising n	ew directions in
	specified					
		Cou		)) with Bloom's Tax Level	onomy	
At the	end of the	course, the stud	lents will be able to			
CO		Cou	rse Outcome State	ement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Apply th	e existing know	ledge on real life p	roblems	III	Applying
CO2		ate the selected t			IV	Analysing
CO3	Verify th	ne outcomes of t	he work have solve	ed the specified proble	ems. V	Evaluating
~		L	ist of Experiment	s / Lab Activities/To	pics	
potenti determ prefera has to The ex statem accord	re-disserta ial and sho ining solu ably on the be in regu caminatior ent, case s	build involve sci attion and must p e area in which t lar contact with a shall consist of tudies, etc, e of work carried	entific research rev preferably bring ou he candidate is inte their guide and the f the preparation	II and should prefer view, design, generati at the individual cont erested to undertake the topic of seminar/dise of report consisting has to be presented in fi	ion/collection and ribution. Seminar ne dissertation wor sertation must be n literature review, o	analysis of data, should be based k. The candidate nutually decided. detailed problem
			Т	xtbooks		
1	Suita	ble books based		the dissertation/semin	nar topic selected	
1	Journa				topic scietted.	
			Re	ferences		
1	paper	rs		the dissertation/semin journals and conferen	•	nd research
	110111	reputed nationa	and international	journais and comercin		

#### **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 ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluation	ion.				
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	50				
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30				
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	- 50				
Lab ESE	Lab activities,	Lab Course	During Week 13	40				
Lau LSL	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.

Assessment Plan based on Bloom's Taxonomy level									
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total					
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum					
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum					
Apply	10	10	10	30					
Analyze	10	10	10	30					
Evaluate	5	5	10	20					
Create	5	5	10	20					
Total	30	30	40	100					

				ege of Engineering				
				ided Autonomous In	stitute)			
				AY 2022-23				
				rse Information				
Progra			M. Tech. (CS and	· · · · · · · · · · · · · · · · · · ·				
Class,			First Year M. Tech	i., Sem II				
Course			6IT531					
Course				ve – 3: Distributed (				
Desire	d Req	uisites:	Operating Systems	, Distributed Netwo	rk			
Те	achin	g Scheme		Examination Sc	heme (Marks)			
Lectur		3 Hrs/week	MSE	ISE	ESE	Т	otal	
Tutori		-	30	20	50		00	
Practi		_		20	50	1	00	
Intera		_		Cred	lits: 3			
muuu	cuon							
			Cou	ırse Objectives				
1			nental characteristics		ating systems.			
2			ited operating system					
3	To ir	terpret the con	nmunication, process			l operating	g systems	
			Course Outcomes		Taxonomy			
A1	1 4	·.1 .1	. 1 . 111 11	Level				
			e students will be abl				A 1	
CO1			teristics of distributed				Analyze	
CO2			rating systems for di		l		Apply	
CO3	Com	pare various di	stributed operating s	ystems			Analyze	
Modu	le		M	odule Contents			Hours	
I		ntroduction to	distributed System				6	
			goals, Hardware and					
			n & Synchronizatio					
		Computer Network and Layered protocols, Message passing and related issues,						
II		synchronization, Client Server model & its implementation, remote procedure call						
		and implementation issues, Case Studies: SUN RPC, DEC RPC Clock						
		synchronization and related algorithms, mutual exclusion,						
		Deadlock in distributed systems         Processes and processors & Distributed File Systems:						
						ma T 1		
ш		•	model, processor al		•		7	
III		balancing and sharing approach, fault tolerance, Real time distributed systems,						
	Process migration and related issues. Introduction, features & goal of distributed file system,							
			ared Memory :	Toucu me system,				
			general architecture	of DSM system	ms design and			
IV			issues of DSM, gran	•	6	ce	6	
		<b>A</b>	dels, replacement stra	•	shared memory spa	,		
		•	ributed Web-based	<u> </u>				
			tures, Basic conce		ed names, Object	locating		
V								
•	mechanisms, Issues in designing human oriented names, Name ca security, DNS Architecture, Processes, Communication, Naming							
	C	onsistency and	l Replication:					
	Web Proxy Caching, Replication for Web Hosting Systems, Replication of Web							
	A	pplications						
		ecurity & Case	e Study :					
<b>X</b> 7 <b>T</b>								
V I	Google FS/BigTable, Introduction of Security in Distributed OS, Overview of security techniques, features, Need, Access Control, Security						. 7	
VI			curity techniques, fea wa RMI, Sun Netwo				7	

	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.						
	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/106/106/106106168/						

CO-PO Mapping								
	Programme Outcomes (PO)							
	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.

Assessment Plan based on Bloom's Taxonomy Level									
Bloom's Taxonomy Level	MSE	ISE	ESE	Total					
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum					
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum					
Apply	10	10	20	40					
Analyze	10	5	10	25					
Evaluate	10	5	10	25					
Create			10	10					
Total	20	20	50	100					

				ege of Engineerin			
			· · · · · · · · · · · · · · · · · · ·	ided Autonomous I AY 2022-23	institute)		
				rse Information			
Progra	amme	<u> </u>	M. Tech. (CS and				
Class,			First Year M. Tec	· · · · · · · · · · · · · · · · · · ·			
Cours			6IT532				
Cours				tive – 3: System Pr	ogramming		
		quisites:		nd Operating System			
Desire	u nu	uisites.	Duta Structures al	ia operating byste	1115		
Те	eachii	ng Scheme		Examination	Scheme (Marks)		
Lectur		3 Hrs/week	MSE	ISE	ESE	Te	otal
Tutori	ial	-	30	20	50	1	00
Practi	cal	-					
Intera	ction	-		Cr	edits: 2		
			Cou	ırse Objectives			
1			cepts in systems pro				
2			ure and design of a				
3	To i		<u> </u>	* *	using system program	ıs	
			irse Outcomes (CO		axonomy Level		
At the	end o	f the course, the	students will be abl	le to,			
CO1			of system program				Analyze
CO2			f parsers of compile				Analyze
CO3	Con	pare the static a	nd dynamic linking				Analyze
Modu		Overview of Sys		odule Contents			Hours
Ι	In S S F	ntroduction, So tructure, Interfa ource Program, rogramming La	ftware, Software ces, Address Space Levels of System nguages and Langu	e, Computer Langu n Software, Overv age Processors, La	ems Programming, M uages, Tools, Life Cy riew of Language Pro- unguage Processing Ac- ing, Symbol	cle of a ocessors	6
Ш	A E I S F	Program Execution, Fundamental of Language Processing, Symbol TablesAssemblers: Elements of Assembly Language Programming, Design of the Assembler, Assembler Design Criteria, Types of Assemblers, Two-Pass Assemblers, One-Pass Assemblers, Single pass Assembler for Intel x86 , Algorithm of Single Pass Assembler, Multi- Pass Assemblers, Advanced Assembly Process, Variants of					6
III	Assemblers Design of two pass assembler,         Macro and Macro Processors:         Introduction, Macro Definition and Call, Macro Expansion, Nested Macro Calls,         Advanced Macro Facilities, Design Of a Macro Pre-processor, Design of a Macro         Assembler, Functions of a Macro Processor, Basic Tasks of a Macro Processor,         Design Issues of Macro Processors, Features, Macro Processor Design Options,         Two-Pass Macro Processors, One-Pass Macro Processors				7		
IV	Li P L C L	rograms, Linkir inking, Loader Compile-and-Go	ocation of Linking og in MSDOS, Lin s, Different Loadi Loaders, General l Relocating Loader	king of Overlay Sing Schemes, Seq Loader Schemes, A	of a Linker, Self-Re tructured Programs, E juential and Direct I Absolute Loaders, Re s, Relocating Linking	Dynamic Loaders,	7

	Scouning and Deuring:			
,	<ul> <li>Scanning and Parsing:</li> <li>Programming Language Grammars, Classification of Grammar, Ambiguity i</li> <li>Grammatic Specification, Scanning, Parsing, Top Down Parsing, Bottom u</li> <li>Parsing, Language Processor Development Tools, LEX, YACC, Compilers: Cause</li> <li>of Large Semantic Gap, Binding and Binding Times, Data Structure used i</li> <li>Compiling, Scope Rules, Memory Allocation, Compilation of Expression,</li> <li>Compilation of Control Structure, Code Optimization</li> </ul>			
\ 	VI Interpreters & Debuggers: 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	, 2007		
3	R.K. Maurya & A. Godbole, "System Programming and Compiler Construction", Dreamted	h		
	Press, 2014			
	References			
1	Leland L. Beck, "System Software – An Introduction to Systems Programming", Pearson Education Asia,3 <sup>rd</sup> 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			
	Useful Links			
1	www.cs.jhu.edu/~scott/pl/lectures/parsing.html			
2	www.en.wikipedia.org/wiki/System_programming			
3	https://nptel.ac.in/courses/106/106/106106197/			

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.

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.

Assessment Plan based on Bloom's Taxonomy Level									
<b>Bloom's Taxonomy Level</b>	MSE	ISE	ESE	Total					
Remember	To be used minimum								
Understand	To be used minimum								
Apply	10	10	20	40					
Analyze	10	5	10	25					
Evaluate	10	5	10	25					
Create			10	10					
Total	30	20	50	100					

				Y 2022-23 se Information				
Progra	mme		M. Tech. (CS and I					
Class,		ster	First Year M. Tech					
Course			6IT533					
Course				ve - 3: Mathematics	for Machine Learning			
		uisites:	Mathematics					
Te	aching	g Scheme		Examination S	cheme (Marks)			
Lectur	e	3 Hrs/week	MSE	ISE	ESE	Total		
<b>Tutorial</b> - 30 20 50						100		
Practic		-						
ntera	ction	-		Cred	lits: 3			
			Cou	rse Objectives				
1	To u	se linear algebr	a and calculus for m	0				
2		<u>v</u>	theory for machine	<u> </u>				
3			zation and probabilit		ns			
		<u> </u>	irse Outcomes (CO	• • • •				
At the	end of	the course, the	e students will be abl	e to,	v			
CO1	Appl	y the concepts	of linear algebra and	l calculus for machi	ne learning algorithms	Apply		
CO2	Com	pare different a	algorithms for dimen	sionality reduction		Analyse		
CO3	Eval	uate the optimize	zation & probabilisti	ic algorithms		Evaluate		
	_							
Modu		inear Algebra		Module Contents Ho				
		inear Aigeora				1		
Ι	V ft	ector spaces an indamental sub	nd subspaces, basis a ospaces.	and dimensions, line	ar transformation, four	6		
І	V ft N p aj	fector spaces an indamental sub <b>fatrix Theory</b> forms and spa- roperties, least pplications, low	nd subspaces, basis a ospaces. : ces, eigenvalues an	d eigenvectors, Sp um normed solutio	ecial Matrices and their ns. SVD: Properties and	6		
	V ft N P aj d D P a	fector spaces and andamental sub <b>fatrix Theory</b> forms and spa- roperties, least pplications, low ecomposition <b>bimensions Re</b> rincipal compo- nd Jordan cano	nd subspaces, basis a ospaces. ces, eigenvalues an squared and minim v rank approximation duction Algorithms onent analysis, linear	d eigenvectors, Sp num normed solutio ns, Gram Schmidt p	ecial Matrices and their ns. SVD: Properties and			
Π	V ft N N A J A D P an C B J a	fector spaces and indamental sub <b>fatrix Theory</b> forms and spa- roperties, least pplications, low ecomposition <b>pimensions Ree</b> rincipal compo- nd Jordan cano <b>calculus:</b> assic concepts of acobian, hessia	nd subspaces, basis a <u>ospaces</u> . ces, eigenvalues an squared and minim v rank approximation duction Algorithms onent analysis, linear nical form.	d eigenvectors, Sp num normed solutio ns, Gram Schmidt p : discriminant analys erivatives, gradient,	ecial Matrices and their ns. SVD: Properties and rocess, polar sis, minimal polynomial directional derivatives,	7		
II	V ft N N P aj du D P an C B Ja C U fc d	fector spaces and indamental sub <b>fatrix Theory</b> forms and spa- roperties, least pplications, low ecomposition <b>pimensions Ree</b> rincipal compo- nd Jordan cano <b>calculus:</b> asic concepts of acobian, hessia <b>ptimization:</b> Inconstrained a per constrained a escent method,	nd subspaces, basis a ospaces. ces, eigenvalues an squared and minim v rank approximation duction Algorithms onent analysis, linear nical form. of calculus: partial de n, convex sets, conve nd Constrained optim	d eigenvectors, Sp num normed solutions, Gram Schmidt p discriminant analys erivatives, gradient, ex functions and its mization, Numerical ptimization: Newtor ethod. Introduction t	ecial Matrices and their ns. SVD: Properties and rocess, polar sis, minimal polynomial directional derivatives, properties. l optimization techniques t's method, Steepest to SVM, Error	7		
II III IV	V fr N N P a d U P a t O C B J a C C U f c d u f c C B J a T A D P a t I D P a t I C B J a t I C B J a t I C B I I B I I C B I I B I I B I I I I	ector spaces an indamental sub <b>Iatrix Theory</b> forms and spa- roperties, least pplications, low ecomposition <b>Dimensions Ree</b> rincipal compo- nd Jordan cano <b>Calculus:</b> asic concepts of acobian, hessia <b>Optimization:</b> Inconstrained a or constrained a escent method, <u>inimizing LPP</u> <b>robability:</b> asic concepts adependence, th	nd subspaces, basis a ospaces. ces, eigenvalues an squared and minim v rank approximation duction Algorithms onent analysis, linear nical form. of calculus: partial de n, convex sets, conver- and unconstrained optim and unconstrained optim Penalty function me c, concepts of duality	d eigenvectors, Sp num normed solutions, Gram Schmidt p discriminant analys erivatives, gradient, ex functions and its mization, Numerica ptimization: Newtor ethod. Introduction to y, hard and soft marg conditional probabi ability, expectation	ecial Matrices and their ns. SVD: Properties and rocess, polar sis, minimal polynomial directional derivatives, properties. l optimization techniques to SVM, Error gin classifiers. llity, Bayes" theorem, and variance, few	7 6 6		

2	S. Axler, "Linear Algebra Done Right", Springer International Publishing, 3 <sup>rd</sup> edition, 2015
	References
1	All Modules taken from below link course.
1	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		

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.

Assessment Plan based on Bloom's Taxonomy Level					
Bloom's Taxonomy Level	MSE	ISE	ESE	Total	
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
Apply	10	10	20	40	
Analyze	10	5	10	25	
Evaluate	10	5	10	25	
Create			10	10	
Total	30	20	50	100	

CO2 evaluate fuzzy logic and neural networks techniques to solve various engineering problems	
Programme         M. Tech. (CS and IT)           Class, Semester         First Year M. Tech., Sem II           Course Code         6IT 534           Course Name         Professional Elective – 3-Soft Computing and applications           Desired Requisites:         Basic knowledge of mathematics           Teaching Scheme         Examination Scheme (Marks)           Lecture         3 Hrs/week         MSE         ISE         ESE           Tutorial         -         30         20         50           Practical         -         Credits: 3         To foster student's abilities to implement soft computing based solutions for real-world pr           To foster student's abilities to implement soft computing based solutions for real-world pr         To foster student's abilities to agorithms           3         To discuss hybrid applications of ANN, Fuzzy and GA         Execure           CO1         analyze soft computing techniques and their roles in building intelligent machines           cvaluate fuzzy logic and neural networks techniques to solve various engineering problems         Evaluate fuzzy logic and neural networks techniques to solve various engineering problems           CO2         evaluate fuzzy logic and neural networks techniques to solve various engineering problems         Evaluate fuzzy logic and neural networks techniques to solve various engineering problems           CO3         build prototyping	
Class, Semester         First Year M. Tech., Sem II           Course Code         GIT 534           Course Name         Professional Elective – 3-Soft Computing and applications           Desired Requisites:         Basic knowledge of mathematics           Teaching Scheme         Examination Scheme (Marks)           Lecture         3 Hrs/week         MSE         ISE         ESE           Tutorial         -         30         20         50         Preactical           Interaction         -         Course Objectives         To         Credits: 3           Interaction         -         Course Objectives         To         To         Statistical neural fuzzy sets, fuzzy logic, genetic algorithms           3         To discuss hybrid applications of ANN, Fuzzy and GA         Course Outcomes (CO) with Bloom's Taxonomy Level           CO1         analyze soft computing techniques and their roles in building intelligent machines         evaluate fuzzy logic and neural networks techniques to solve various engineering problems           CO2         evaluate fuzzy logic and neural networks techniques to solve various engineering problems         Fuzzy Logic: Fuzzy Sets, Operations using genetic algorithms and hybrid approaches           Module         Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional Alt to Computing. Difference between Hard Computing and Soft C	
Course Name         Professional Elective – 3-Soft Computing and applications           Desired Requisites:         Basic knowledge of mathematics           Teaching Scheme         Examination Scheme (Marks)           Lecture         3 Hrs/week         MSE         ISE         ESE           Tutorial         -         30         20         50           Practical         -         -         Credits: 3           Interaction         -         Credits: 3         -           To foster student's abilities to implement soft computing based solutions for real-world probability of the proba	
Desired Requisites:         Basic knowledge of mathematics           Teaching Scheme         Examination Scheme (Marks)           Lecture         3 Hrs/week         MSE         ISE         ESE           Tutorial         -         30         20         50         Practical           Practical         -         -         Course Objectives         Interaction         -         Credits: 3           Course Objectives           1         To foster student's abilities to implement soft computing based solutions for real-world p           To impart knowledge of non-traditional technologies and fundamentals of artificial neural fuzzy sets, fuzzy logic, genetic algorithms         -           3         To discuss hybrid applications of ANN, Fuzzy and GA         -           CO1         analyze soft computing techniques and their roles in building intelligent machines         -           CO2         evaluate fuzzy logic and neural networks techniques to solve various engineering problems         -           CO3         build prototyping applications using genetic algorithms and hybrid approaches         -           Module         Module Contents         -           Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing. Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation           II	
Teaching Scheme         Examination Scheme (Marks)           Lecture         3 Hrs/week         MSE         ISE         ESE           Tutorial         -         30         20         50           Practical         -         -         -           Interaction         -         Course Objectives         -           1         To foster student's abilities to implement soft computing based solutions for real-world pr         -           1         To foster student's abilities to implement soft computing based solutions for real-world pr         -           1         To foster student's abilities to implement soft computing based solutions for real-world pr         -           1         To foster student's abilities to implement soft computing based solutions for real-world pr         -           1         To discuss hybrid applications of ANN, Fuzzy and GA         -           2         fuzzy sets, fuzzy logic and neural networks techniques to solve various engineering problems         -           CO2         evaluate fuzzy logic and neural networks techniques to solve various engineering problems         -           CO3         build prototyping applications using genetic algorithms and hybrid approaches         -           Module         Module Contents         -           Introduction:         Evazy Logic: Fuzzy Sets, Operations on Fu	
Lecture       3 Hrs/week       MSE       ISE       ESE         Tutorial       -       30       20       50         Practical       -       -       -         Interaction       -       Credits: 3         Course Objectives         1       To foster student's abilities to implement soft computing based solutions for real-world p         70 impart knowledge of non-traditional technologies and fundamentals of artificial neural       fuzzy sets, fuzzy logic, genetic algorithms         3       To discuss hybrid applications of ANN, Fuzzy and GA       -         Course Outcomes (CO) with Bloom's Taxonomy Level         CO1       analyze soft computing techniques and their roles in building intelligent machines         evaluate fuzzy logic and neural networks techniques to solve various engineering problems       -         CO3       build prototyping applications using genetic algorithms and hybrid approaches       -         Module       Module Contents       -         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems,	
Lecture       3 Hrs/week       MSE       ISE       ESE         Tutorial       -       30       20       50         Practical       -       -       -         Interaction       -       Credits: 3         Course Objectives         1       To foster student's abilities to implement soft computing based solutions for real-world p         To impart knowledge of non-traditional technologies and fundamentals of artificial neural       fuzzy sets, fuzzy logic, genetic algorithms         3       To discuss hybrid applications of ANN, Fuzzy and GA       -         Course Outcomes (CO) with Bloom's Taxonomy Level         CO1       analyze soft computing techniques and their roles in building intelligent machines         evaluate fuzzy logic and neural networks techniques to solve various engineering problems       -         CO2       evaluate fuzzy logic and neural networks techniques to solve various engineering problems         CO3       build prototyping applications using genetic algorithms and hybrid approaches         Module       Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Rela	
Tutorial       -       30       20       50         Practical       -       -       -         Interaction       -       Credits: 3         Course Objectives         1       To foster student's abilities to implement soft computing based solutions for real-world principart knowledge of non-traditional technologies and fundamentals of artificial neural fuzzy sets, fuzzy logic, genetic algorithms         3       To discuss hybrid applications of ANN, Fuzzy and GA         Course Outcomes (CO) with Bloom's Taxonomy Level         C01       analyze soft computing techniques and their roles in building intelligent machines         evaluate fuzzy logic and neural networks techniques to solve various engineering problems       -         C03       build prototyping applications using genetic algorithms and hybrid approaches         Module       Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learn	
Practical       -         Interaction       -         Course Objectives         1       To foster student's abilities to implement soft computing based solutions for real-world properties and fundamentals of artificial neural fuzzy sets, fuzzy logic, genetic algorithms         3       To discuss hybrid applications of ANN, Fuzzy and GA         Course Outcomes (CO) with Bloom's Taxonomy Level         C01       analyze soft computing techniques and their roles in building intelligent machines         evaluate fuzzy logic and neural networks techniques to solve various engineering problems         C03       build prototyping applications using genetic algorithms and hybrid approaches         Module       Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         I       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks         IIII       Renetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	Total
Interaction         -         Credits: 3           Course Objectives           1         To foster student's abilities to implement soft computing based solutions for real-world property in the property of the property o	100
Course Objectives           1         To foster student's abilities to implement soft computing based solutions for real-world prediction of the problem of the p	
1       To foster student's abilities to implement soft computing based solutions for real-world properties to impart knowledge of non-traditional technologies and fundamentals of artificial neural fuzzy sets, fuzzy logic, genetic algorithms         3       To discuss hybrid applications of ANN, Fuzzy and GA         Course Outcomes (CO) with Bloom's Taxonomy Level         C01       analyze soft computing techniques and their roles in building intelligent machines         evaluate fuzzy logic and neural networks techniques to solve various engineering problems       evaluate fuzzy logic and neural networks techniques to solve various engineering problems         C03       build prototyping applications using genetic algorithms and hybrid approaches         Module       Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks         IIII       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
1       To foster student's abilities to implement soft computing based solutions for real-world problems         2       To impart knowledge of non-traditional technologies and fundamentals of artificial neural fuzzy sets, fuzzy logic, genetic algorithms         3       To discuss hybrid applications of ANN, Fuzzy and GA         Course Outcomes (CO) with Bloom's Taxonomy Level         C01       analyze soft computing techniques and their roles in building intelligent machines         evaluate fuzzy logic and neural networks techniques to solve various engineering problems       evaluate fuzzy logic and neural networks techniques to solve various engineering problems         C03       build prototyping applications using genetic algorithms and hybrid approaches         Module       Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks         IIII       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
Image: To impart knowledge of non-traditional technologies and fundamentals of artificial neural fuzzy sets, fuzzy logic, genetic algorithms         Image: To discuss hybrid applications of ANN, Fuzzy and GA         Image: To discuss hybrid applications of ANN, Fuzzy and GA         Image: To discuss hybrid applications of ANN, Fuzzy and GA         Image: To discuss hybrid applications of ANN, Fuzzy and GA         Image: To discuss hybrid applications of ANN, Fuzzy and GA         Image: To discuss hybrid applications of ANN, Fuzzy and GA         Image: To discuss hybrid applications of ANN, Fuzzy and GA         Image: To discuss hybrid applications of COP with Bloom's Taxonomy Level         CO1       analyze soft computing techniques and their roles in building intelligent machines         Image: To discuss hybrid applications using genetic algorithms and hybrid approaches         CO3       build prototyping applications using genetic algorithms and hybrid approaches         Image: To discuss hybrid applications of Computing: Soft Computing Constituents, From Conventional AI to Computing: Soft Computing Constituents, From Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         Image: The systems, Fuzzy Reasoning, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         Image: To discuss hybrid apsis Function Networks : Reinforcement Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Net	rohleme
2       fuzzy sets, fuzzy logic, genetic algorithms         3       To discuss hybrid applications of ANN, Fuzzy and GA         3       To discuss hybrid applications of ANN, Fuzzy and GA         Course Outcomes (CO) with Bloom's Taxonomy Level         C01       analyze soft computing techniques and their roles in building intelligent machines         evaluate fuzzy logic and neural networks techniques to solve various engineering problems       evaluate fuzzy logic and neural networks techniques to solve various engineering problems         C03       build prototyping applications using genetic algorithms and hybrid approaches         Module       Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks         III       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
3       To discuss hybrid applications of ANN, Fuzzy and GA         Course Outcomes (CO) with Bloom's Taxonomy Level         C01       analyze soft computing techniques and their roles in building intelligent machines         evaluate fuzzy logic and neural networks techniques to solve various engineering problems       evaluate fuzzy logic and neural networks techniques to solve various engineering problems         C03       build prototyping applications using genetic algorithms and hybrid approaches         Module       Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning, Unsupervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks         III       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
Course Outcomes (CO) with Bloom's Taxonomy Level           CO1         analyze soft computing techniques and their roles in building intelligent machines           CO2         evaluate fuzzy logic and neural networks techniques to solve various engineering problems           CO3         build prototyping applications using genetic algorithms and hybrid approaches           Module         Module Contents           Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation           II         Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making           III         Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks           III         Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
CO1analyze soft computing techniques and their roles in building intelligent machinesCO2evaluate fuzzy logic and neural networks techniques to solve various engineering problemsCO3build prototyping applications using genetic algorithms and hybrid approachesModuleModule ContentsIntroduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and AdaptationIIFuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision MakingIIINeural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural NetworksIVGenetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
CO1analyze soft computing techniques and their roles in building intelligent machinesCO2evaluate fuzzy logic and neural networks techniques to solve various engineering problemsCO3build prototyping applications using genetic algorithms and hybrid approachesModuleModule ContentsIntroduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and AdaptationIIFuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision MakingIIINeural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural NetworksIVGenetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
CO2       evaluate fuzzy logic and neural networks techniques to solve various engineering problems         CO3       build prototyping applications using genetic algorithms and hybrid approaches         Module       Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks         IV       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	Analyze
CO2       problems         CO3       build prototyping applications using genetic algorithms and hybrid approaches         Module       Module Contents         Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computing and Intelligence, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks         IV       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	Evaluate
Module       Module Contents         I       Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation         II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks         III       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and AdaptationIIFuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision MakingIIINeural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural NetworksIVGenetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	Create
Introduction: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and AdaptationIIFuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision MakingIIINeural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural NetworksIVGenetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
IConventional AI to Computational Intelligence, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and AdaptationIIFuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision MakingIIINeural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural NetworksIVGenetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	Hours
IComputing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and AdaptationIIFuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision MakingIIINeural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural NetworksIVGenetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
IIFuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision MakingIIINeural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural NetworksIVGenetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	6
II       Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks         IV       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	U
IIMembership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision MakingIIINeural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural NetworksIVGenetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
II       Systems, Fuzzy Expert Systems, Fuzzy Decision Making         III       Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in 	
III       Neural Networks: Machine Learning Using Neural Network, Adaptive         Networks, Feed forward Networks, Supervised Learning Neural Networks,         Radial Basis Function Networks : Reinforcement Learning, Unsupervised         Learning Neural Networks, Adaptive Resonance Architectures, Advances in         Neural Networks         Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of         IV	7
III       Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks         IV       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	,
III       Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks         IV       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
III       Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks         IV       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	
III       Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks         IV       Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	-
Neural Networks         Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge	7
Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of         IV       GA in Machine Learning : Machine Learning Approach to Knowledge	
IV GA in Machine Learning : Machine Learning Approach to Knowledge	
Acquisition	7
V Hybrid Systems: Introduction to Hybrid Systems, Adaptive Neuro Fuzzy	

	Deep Learning: Spark auto encoder, Convolutional neural networks, Recurrent	
VI	neural networks, Deep belief networks	

	Text Books				
1	Rajasekaran S., Vijayalakshmi Pai G.A., "Neural Networks, Fuzzy Logic and Genetic				
1	Algorithms", PHI, 2003				
2	2 Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press e-book				
3	3				
4	4				
	References				

	References
1	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2003
2	George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications", PHI, 1995
3	
4	

Useful Links CO-PO Mapping							
	Programme	Outcomes (I	PO)				
	1	2	3	4	5	6	
CO1	2			3			
CO2			2	2		2	
CO3	2		2	2		2	
The st	rength of map	ping is to be	written as 1	,2,3; Here, 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)

	Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bl	oom's Taxonomy Level	MSE	ISE	ESE	Total		
1	Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
2	Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
3	Apply	10	10	20	40		
4	Analyze	10	5	10	25		
5	Evaluate	10	5	10	25		
6	Create			10	10		
	Total	30	20	50	100		

7

				of Engineering, San					
			1	l Autonomous Institut <b>2022-23</b>	(e)				
				Information					
Progra	mme		M. Tech. (CS and IT						
Class, S		er	First Year M. Tech.						
Course	Code		6IT535						
Course	Name		Professional Electiv	e - 4: Big Data Comp	outing				
Desired	l Requ	isites:	Data Mining						
Т	eaching	g Scheme		Examination Sch	eme (Marks)				
Lecture		3 Hrs/week	MSE	ISE	ESE	Total			
Tutoria		-	30	20	50	100			
Practic		_							
Interac		_		Credits	: 3				
				Objectives					
1			amental concepts of b						
2			ta using various techn	~					
3	To rep	· -	using visualization to						
			rse Outcomes (CO) w		omy Level				
			udents will be able to						
CO1			entals of various big d			Apply			
CO2			roach to implement di			Analyze			
CO3	Evalu	ate the performa	ance of algorithms on	advanced distributed	system	Evaluate			
Modu	le		Modul	e Contents		Hours			
		troduction to <b>H</b>				6			
Ι		Big Data and its Importance, Four V's of Big Data, Drivers for Big Data –							
			g Data Analytics, Big	Data Analytics appli	cations.				
		ig Data Techno				7			
Π			World, Data discove						
					Analytics, Cloud and Big Data, Predictive Analytics, Mobile Business Intelligence				
		id Big Data, Cro							
				es, Inter- and Trans-F	irewall Analytics				
		rocessing Big D	ata:		ż				
	D	rocessing Big D etecting Patterns	ata: s in Complex Data wit	h Clustering and Lin	k Analysis,				
III	De Id	rocessing Big D etecting Patterns entifying previo	ata: s in Complex Data wit ously unknown groupi	h Clustering and Lin ngs within a data set,	k Analysis, Segmenting the	7			
III	De Id cu	rocessing Big D etecting Patterns entifying previo istomer market	ata: s in Complex Data wit ously unknown groupin with the K–Means alg	h Clustering and Lin ngs within a data set, orithm, Defining sim	k Analysis, Segmenting the ilarity with	7			
III	De Id cu ap	rocessing Big D etecting Patterns entifying previo istomer market opropriate distan	ata: s in Complex Data wit ously unknown groupin with the K–Means alg ce measures, Construe	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster	k Analysis, Segmenting the ilarity with rs with hierarchical	7			
	D Id cu ap cl	rocessing Big D etecting Patterns entifying previo istomer market opropriate distan ustering, Cluster	ata: s in Complex Data wit ously unknown groupin with the K–Means algo ce measures, Construc- ring text documents ar	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster	k Analysis, Segmenting the ilarity with rs with hierarchical				
III IV	Du Id cu ap cl H	rocessing Big D etecting Patterns entifying previo stomer market opropriate distan ustering, Cluster adoop Mapred	ata: s in Complex Data with ously unknown groupin with the K–Means alg ce measures, Construc- ring text documents an uce:	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster nd tweets to aid under	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding	7			
	Du Id cu ap cl H In	rocessing Big D etecting Patterns entifying previo istomer market propriate distan ustering, Cluster adoop Mapred troduction to M	ata: s in Complex Data with ously unknown groupin with the K–Means alg ce measures, Construc- ring text documents an uce: ap-Reduce, Hadoop F	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster nd tweets to aid under	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding				
	Du Id cu ap cl H In D	rocessing Big D etecting Patterns entifying previo stomer market v opropriate distan ustering, Cluster adoop Mapred troduction to M istributed Map	ata: s in Complex Data wit ously unknown groupin with the K–Means alg ce measures, Construc- ring text documents an uce: ap-Reduce, Hadoop F Reduce:	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster ad tweets to aid under ramework, Spark Fra	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework	6			
IV	During During During The During T	rocessing Big D etecting Patterns entifying previo stomer market v opropriate distan ustering, Cluster adoop Mapred troduction to M istributed Map	ata: s in Complex Data with ously unknown groupin with the K–Means alg ce measures, Construc- ring text documents an uce: ap-Reduce, Hadoop F	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster ad tweets to aid under ramework, Spark Fra	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework				
IV	Du Id cu ap cl H In D Th SI	rocessing Big D etecting Patterns entifying previous stomer market we propriate distan ustering, Cluster adoop Mapred troduction to M istributed Map F-IDF Example, park	ata: s in Complex Data wit ously unknown groupin with the K–Means alg ce measures, Construc- ring text documents an uce: ap-Reduce, Hadoop F Reduce:	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster ad tweets to aid under ramework, Spark Fra	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework	6			
IV	Du Id cu ap cl H In D TI Sp A	rocessing Big D etecting Patterns entifying previous stomer market we propriate distant ustering, Cluster adoop Mapred troduction to M istributed Map F-IDF Example, park nalytic Tools:	ata: s in Complex Data wit ously unknown groupin with the K–Means alg ce measures, Construc- ring text documents an uce: ap-Reduce, Hadoop F Reduce:	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster nd tweets to aid under ramework, Spark Fra Demonstration: Page	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework e Rank Algorithm in	6			
IV V	Du Id cu ap cl H In D Th Sj A Pl	rocessing Big D etecting Patterns entifying previo istomer market v propriate distan ustering, Cluster adoop Mapred troduction to M istributed Map F-IDF Example, park nalytic Tools: IG overview, SQ	ata: s in Complex Data with ously unknown groupin with the K-Means alg ce measures, Construc- ring text documents an <b>uce:</b> ap-Reduce, Hadoop F <b>Reduce:</b> Page Rank Example,	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster nd tweets to aid under ramework, Spark Fra Demonstration: Page	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework e Rank Algorithm in	6			
IV V	Du Id cu ap cl H In D Th Sj A Pl	rocessing Big D etecting Patterns entifying previo istomer market v propriate distan ustering, Cluster adoop Mapred troduction to M istributed Map F-IDF Example, park nalytic Tools: IG overview, SQ	ata: s in Complex Data with ously unknown groupin with the K–Means alg ce measures, Construc- ring text documents an <b>uce:</b> ap-Reduce, Hadoop F <b>Reduce:</b> Page Rank Example, PL vs. PIG, PIG Latin, ew of Hive, Hive QL,	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster ad tweets to aid under ramework, Spark Fra Demonstration: Page User Defined Functi Tables, Querying Da	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework e Rank Algorithm in	6			
IV V VI	Du Id cu ap cl H In D T Sp Pl O	rocessing Big D etecting Patterns entifying previous stomer market vo propriate distan ustering, Cluster adoop Mapred troduction to M istributed Map F-IDF Example, park nalytic Tools: IG overview, SQ perators, Overvi	ata: s in Complex Data with ously unknown groupin with the K–Means alg ce measures, Construc- ring text documents an <b>uce:</b> ap-Reduce, Hadoop F <b>Reduce:</b> Page Rank Example, PL vs. PIG, PIG Latin, ew of Hive, Hive QL, <b>Tex</b>	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster ad tweets to aid under ramework, Spark Fra Demonstration: Page User Defined Functi Tables, Querying Da	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework e Rank Algorithm in tons, Data Processing ata	6 6 7			
IV V VI	Prajap	rocessing Big D etecting Patterns entifying previous istomer market wo propriate distan ustering, Cluster adoop Mapred troduction to M istributed Map F-IDF Example, park nalytic Tools: G overview, SQ perators, Overvious pati Vignesh, "E	ata:         s in Complex Data with         busly unknown grouping         with the K—Means algoright         with the K—Means algoright         ce measures, Constructing text documents and         uce:         ap-Reduce, Hadoop F         Reduce:         Page Rank Example,         DL vs. PIG, PIG Latin,         ew of Hive, Hive QL,         Tex         Big Data Analytics with	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster nd tweets to aid under ramework, Spark Fra Demonstration: Page User Defined Functi Tables, Querying Da <b>t Books</b> <i>h R and Hadoop</i> ", Pa	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework e Rank Algorithm in cons, Data Processing ata	6 6 7 ion, 2013			
IV V VI	Du Id cu ap cl H In D TT Sj A PI O O	rocessing Big D etecting Patterns entifying previo istomer market v propriate distan ustering, Cluster adoop Mapred troduction to M istributed Map F-IDF Example, park nalytic Tools: IG overview, SQ perators, Overvi	ata: s in Complex Data with ously unknown groupin with the K-Means alg ce measures, Construc- ring text documents an <b>uce:</b> ap-Reduce, Hadoop F <b>Reduce:</b> Page Rank Example, Page Rank Example, OL vs. PIG, PIG Latin, ew of Hive, Hive QL, <u>Tex</u> <i>Big Data Analytics with</i> mbers Michehe, " <i>Big</i>	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster nd tweets to aid under ramework, Spark Fra Demonstration: Page User Defined Functi Tables, Querying Data t Books h R and Hadoop ", Pa Data, Big Analytics:	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework e Rank Algorithm in ons, Data Processing ata ackt Publishing, 1 <sup>st</sup> Editi <i>Emerging Business Inte</i>	6 6 7 ion, 2013 elligence			
IV V VI	Du Id cu ap cl H In D TT Sj A PI O O	rocessing Big D etecting Patterns entifying previo istomer market v propriate distan ustering, Cluster adoop Mapred troduction to M istributed Map F-IDF Example, park nalytic Tools: IG overview, SQ perators, Overvi	ata: s in Complex Data with ously unknown groupin with the K-Means alg ce measures, Construc- ring text documents an <b>uce:</b> ap-Reduce, Hadoop F <b>Reduce:</b> Page Rank Example, Page Rank Example, OL vs. PIG, PIG Latin, ew of Hive, Hive QL, <u>Tex</u> <i>Big Data Analytics with</i> mbers Michehe, " <i>Big</i>	h Clustering and Lin ngs within a data set, orithm, Defining sim cting tree–like cluster nd tweets to aid under ramework, Spark Fra Demonstration: Page User Defined Functi Tables, Querying Data t Books h R and Hadoop ", Pa Data, Big Analytics:	k Analysis, Segmenting the ilarity with rs with hierarchical rstanding mework e Rank Algorithm in cons, Data Processing ata	6 6 7 ion, 2013 elligence			

1	1Franks 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			

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.

Assessment Plan based on Bloom's Taxonomy Level								
<b>Bloom's Taxonomy Level</b>	MSE	ISE	ESE	Total				
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Apply	10	10	20	40				
Analyze	10	5	10	25				
Evaluate	10	5	10	25				
Create			10	10				
Total	30	20	50	100				

				lege of Engineerin Aided Autonomous I			
				AY 2022-23			
D.				Irse Information			
	amme		M. Tech. (CS and	,			
	Seme		First Year M. Teo	ch., Sem II			
	e Cod		6IT536				
	e Nam	-		tive - 4: High Perfo	rmance Computing		
Desire	ed Req	uisites:	Operating System	n			
Т	eachin	g Scheme		Examination	Scheme (Marks)		
Lectu		3 Hrs/week	MSE	ISE	ESE	L I	otal
Futori		-	30	20	50		100
Practi		_					
Intera		_		Cr	edits: 3		
			Co	urse Objectives			
1	To el	aborate the con	cepts of process an	d thread in high per	formance computing		
2	Toe	valuate the perfe	ormance of parallel	programs with sequ	uential program		
3	To co	ompare multi-co	ore and many-core	architectures			
				O) with Bloom's T	axonomy Level		
			students will be ab				
C <b>O1</b>		• • •		solving the problem			Apply
<b>CO2</b> Analyse the parallel implemented algorithms for performance parameters.						Analyz	
							•
CO3	Desi	gn the appropria	ate parallel algorith	m for the given pro			•
03	Desi	gn the appropria	ate parallel algorith				•
		gn the appropria	• •	m for the given pro			Create
	ıle		Mo				Create
Modu	ile B	asic Parallel A	Mo Igorithm	m for the given pro	blem.	Running	Create Hours
	lle B It	asic Parallel A	Mo Igorithm Parallel Compu	m for the given prob odule Contents uting, Parallelism	on the JVM, F		Create
Modu	lle B It C	<b>Easic Parallel A</b> attroduction to computations in	Mo Igorithm Parallel Compt Parallel, Monte Ca	m for the given prob odule Contents uting, Parallelism urlo Method to Estin	blem.		Create
Modu	ile B In C B	asic Parallel A ntroduction to computations in casic Task in Paragenetic Parag	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms	m for the given pro odule Contents uting, Parallelism urlo Method to Estin	on the JVM, F	asks	Create
Modu I	Ile B In C B P	asic Parallel A atroduction to computations in asic Task in Pa arallel Sorting,	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar	m for the given pro odule Contents uting, Parallelism urlo Method to Estin	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu	asks	Create Hours 6
Modu I II	Ile B In C B P C C D	asic Parallel A atroduction to computations in asic Task in Pa arallel Sorting, peration Assoc ata-Parallelism	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro	m for the given pro odule Contents ating, Parallelism arlo Method to Estin od Parallel Mapping can (Prefix Sum) Op	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu	asks ce)	Create Hours 6 7
Modu I	ILE B ILI C B P C C D P	Sasic Parallel A introduction to computations in Sasic Task in Pa arallel Sorting, peration Assoc Data-Parallelism arallel Collection	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons	m for the given pro odule Contents ating, Parallelism arlo Method to Estin od Parallel Mapping can (Prefix Sum) Op	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration	asks ce)	Create Hours 6
Modu I II	lle B In C B P C D P S	asic Parallel A ntroduction to computations in asic Task in Pa arallel Sorting, peration Assoc ata-Parallelism arallel Collection Splitters and Co	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons mbiners	m for the given pro odule Contents ating, Parallelism arlo Method to Estin ad Parallel Mapping can (Prefix Sum) Op ogramming, Data-Pa	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration	asks ce)	Create Hours 6 7
Modu I II III	lle B In C B P C C D P S S D	asic Parallel A ntroduction to computations in asic Task in Pa arallel Sorting, peration Assoc pata-Parallelism arallel Collection Splitters and Co pata Structures	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons mbiners for Parallel Com	m for the given pro odule Contents ating, Parallelism arlo Method to Estin and Parallel Mapping can (Prefix Sum) Op ogramming, Data-Pa	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration rallel Operations, Sca	asks ce) ala	Create Hours 6 7 7
Modu I II	Ile B In C B P C C D P S S D In	Sasic Parallel A ntroduction to computations in Sasic Task in Pa arallel Sorting, peration Assoc Data-Parallelism arallel Collection Splitters and Co pata Structures nplementing Co	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons mbiners for Parallel Com pombiners, Parallel 7	m for the given pro odule Contents ating, Parallelism arlo Method to Estin and Parallel Mapping can (Prefix Sum) Op ogramming, Data-Pa puting Fwo-phase Construct	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration rallel Operations, Sca ction, Conc-tree Data	asks ce) ala	Create Hours 6 7
II III	ILE B ILI CC B P CC D P S S LI I S	Sasic Parallel A introduction to computations in Sasic Task in Pa- arallel Sorting, peration Assoc Pata-Parallelism arallel Collection Splitters and Co Pata Structures inplementing Co tructure, Amort	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons mbiners for Parallel Com pombiners, Parallel 7	m for the given pro odule Contents ating, Parallelism arlo Method to Estin and Parallel Mapping can (Prefix Sum) Op ogramming, Data-Pa puting Fwo-phase Construct	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration rallel Operations, Sca	asks ce) ala	Create Hours 6 7 7
Modu I II III	Ile B In C B P C C D P S S D In S S	asic Parallel A ntroduction to computations in asic Task in Pa arallel Sorting, peration Assoc ata-Parallelism arallel Collection oplitters and Co pata Structures nplementing Co tructure, Amort orting	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons mbiners for Parallel Com- ombiners, Parallel T ized, Constant-time	m for the given pro odule Contents ating, Parallelism arlo Method to Estin and Parallel Mapping can (Prefix Sum) Op ogramming, Data-Pa puting Fwo-phase Construct e Append Operation	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration rallel Operations, Sca ction, Conc-tree Data	asks ce) ala	Create Hours 6 7 7
Modu I II III IV V	Ile B B In C B P C C D D P S S In S S Is	asic Parallel A ntroduction to computations in asic Task in Pa arallel Sorting, peration Assoc pata-Parallelism arallel Collection Splitters and Co pata Structures nplementing Co tructure, Amort orting asues, sorting ne	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons mbiners for Parallel Com- pombiners, Parallel 7 ized, Constant-time etwork, Bubble sort	m for the given pro odule Contents ating, Parallelism arlo Method to Estin and Parallel Mapping can (Prefix Sum) Op ogramming, Data-Pa puting Fwo-phase Construct e Append Operation	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration rallel Operations, Sca ction, Conc-tree Data	asks ce) ala	Create Hours 6 7 7 7 7
Modu I II III IV	Ile B B In C B P C C D P S S In S S S S S S S S S S S S S S S S	asic Parallel A ntroduction to computations in asic Task in Pa arallel Sorting, peration Assoc pata-Parallelism arallel Collection plitters and Co pata Structures nplementing Co tructure, Amort orting asues, sorting ne Graph Algorith	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro ons mbiners for Parallel Compon ized, Constant-time etwork, Bubble sort ms	m for the given pro odule Contents ating, Parallelism arlo Method to Estin and Parallel Mapping can (Prefix Sum) Op ogramming, Data-Pa puting Fwo-phase Construct e Append Operation	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration rallel Operations, Sca ction, Conc-tree Data	asks ce) ala	Create Hours 6 7 7 7 7
Modu I II III IV V	Ile B B In C B P C C D P S S In S S S S S S S S S S S S S S S S	asic Parallel A ntroduction to computations in asic Task in Pa arallel Sorting, peration Assoc pata-Parallelism arallel Collection Splitters and Co pata Structures nplementing Co tructure, Amort orting asues, sorting ne	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro ons mbiners for Parallel Compon ized, Constant-time etwork, Bubble sort ms	m for the given pro odule Contents ating, Parallelism urlo Method to Estin and Parallel Mapping an (Prefix Sum) Op ogramming, Data-Pa puting Fwo-phase Construct e Append Operation	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration rallel Operations, Sca ction, Conc-tree Data	asks ce) ala	Create Hours 6 7 7 7 7 6
Modu I II III IV V	Ile B In C B P C D P S S In S S S S S S S S S S S S S S S S	Sasic Parallel A ntroduction to computations in Sasic Task in Pa arallel Sorting, peration Assoc Pata-Parallelism arallel Collection Splitters and Co Pata Structures nplementing Co tructure, Amort orting ssues, sorting ne Graph Algorithm IST, SSSP, APS	Ma Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons mbiners for Parallel Com- ombiners, Parallel 7 ized, Constant-time etwork, Bubble sort ms SP	m for the given pro odule Contents ating, Parallelism arlo Method to Estin od Parallel Mapping an (Prefix Sum) Op ogramming, Data-Pa puting Two-phase Construct e Append Operation	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu- eration rallel Operations, Sca ction, Conc-tree Data , Conc-Tree Combin	asks ce) ala ers	Create Hours 6 7 7 7 7 6 6 6
Modu I II III IV V	Ile B In C B P C D P S S In S S S S S S M M	asic Parallel A ntroduction to computations in asic Task in Pa arallel Sorting, peration Assoc pata-Parallelism arallel Collection plitters and Co pata Structures mplementing Co tructure, Amort orting asues, sorting ne asues, sorting ne	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro ons mbiners for Parallel Componies, Parallel 7 ized, Constant-time etwork, Bubble sort ms SP	m for the given pro odule Contents ating, Parallelism arlo Method to Esting and Parallel Mapping an (Prefix Sum) Op ogramming, Data-Pa puting Fwo-phase Construct e Append Operation t Text Books arypis, Vipin Kumar	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu eration rallel Operations, Sca ction, Conc-tree Data	asks ce) ala ers	Create Hours 6 7 7 7 7 6 6 6
Modu I II III IV V VI	Ile B In C B P C D P S S In S S S S S S M M	asic Parallel A ntroduction to computations in asic Task in Pa arallel Sorting, peration Assoc pata-Parallelism arallel Collection plitters and Co pata Structures mplementing Co tructure, Amort orting asues, sorting ne asues, sorting ne	Ma Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons mbiners for Parallel Com- ombiners, Parallel 7 ized, Constant-time etwork, Bubble sort ms SP	m for the given pro odule Contents ating, Parallelism arlo Method to Esting and Parallel Mapping an (Prefix Sum) Op ogramming, Data-Pa puting Fwo-phase Construct e Append Operation t Text Books arypis, Vipin Kumar	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu- eration rallel Operations, Sca ction, Conc-tree Data , Conc-Tree Combin	asks ce) ala ers	Create Hours 6 7 7 7 7 6 6 6
Modu I II III IV V VI	Ile B In C B P C D P S S In S S S S S S M M	asic Parallel A ntroduction to computations in asic Task in Pa arallel Sorting, peration Assoc pata-Parallelism arallel Collection plitters and Co pata Structures mplementing Co tructure, Amort orting asues, sorting ne asues, sorting ne	Mo Igorithm Parallel Compu Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro ons mbiners for Parallel Componies, Parallel 7 ized, Constant-time etwork, Bubble sort ms SP	m for the given prof odule Contents ating, Parallelism arlo Method to Esting and Parallel Mapping an (Prefix Sum) Op ogramming, Data-Pa puting Fwo-phase Construct e Append Operation t Text Books arypis, Vipin Kumar 003	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu- eration rallel Operations, Sca ction, Conc-tree Data , Conc-Tree Combin	asks ce) ala ers	Create Hours 6 7 7 7 7 6 6 6
Modu I II III IV V VI	Ile B In C B P C C D P S D In S S S Is G M M	<b>Fasic Parallel A</b> attroduction to computations in <b>Fasic Task in Pa</b> arallel Sorting, peration Assoc <b>Pata-Parallelist</b> arallel Collection <b>Splitters and Co</b> <b>Pata Structures</b> mplementing Co tructure, Amort <b>orting</b> ssues, sorting net <b>Fraph Algorith</b> IST, SSSP, APS h Grama, Ansul <i>nd Edition</i> ", Pe	Ma Igorithm Parallel Compu- Parallel, Monte Ca arallel Algorithms Data Operations ar iativity, Parallel Sc n Data-Parallel Pro- ons mbiners for Parallel Com- ombiners, Parallel Com- ombiners, Parallel Com- ized, Constant-time etwork, Bubble sort ms SP I Gupta, George Ka arson Education, 2	m for the given pro odule Contents ating, Parallelism arlo Method to Estin and Parallel Mapping an (Prefix Sum) Op ogramming, Data-Pa puting Two-phase Construct e Append Operation t Text Books arypis, Vipin Kumar 003 References	on the JVM, F nate Pi, First-Class Ta , Parallel Fold (Redu- eration rallel Operations, Sca ction, Conc-tree Data , Conc-Tree Combin	asks ce) ala ers <i>urallel cor</i>	Create Hours 6 7 7 7 7 6 6 6 6

#### **Useful Links**

Module I, II, III, IV

1

https://www.coursera.org/learn/parprog1?ranMID=40328&ranEAID=\*GqSdLGGurk&ranSiteID =.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			

## 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.

Assessm	Assessment Plan based on Bloom's Taxonomy Level									
Bloom's Taxonomy Level	MSE	ISE	ESE	Total						
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum						
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum						
Apply	10	10	20	40						
Analyze	10	5	10	25						
Evaluate	10	5	10	25						
Create			10	10						
Total	30	20	50	100						

		(Government)	Aided Autonomous I	nstitute)	
		Ca	AY 2022-23 urse Information		
Program	<b>m</b> o	M. Tech. (CS an			
Class, Se		First Year M. Te			
Course (		6IT537			
Course N			ctive - 4: Deep Learr	ina	
	Requisites:	FIOIESSIOIIAI LIE	clive - 4. Deep Lean	iiiig	
Desireu	Requisites.				
Teac	ching Scheme		Examination	Scheme (Marks)	
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
<u>Futorial</u>		30	20	50	100
Practical			20	20	100
Interacti			Cre	edits: 3	
		Co	ourse Objectives		
1 7	To elaborate the mo		0		
		<b>^</b>	Learning with perform	nance parameters	
3 7	To interpret the prol	olem to solve using	g Deep Learning	*	
	Со	urse Outcomes (C	CO) with Bloom's Ta	axonomy Level	
	d of the course, the				
		<b>A</b>	ning for suitable appl		Apply
	<u> </u>	A	pertaining to Deep Le		Analyze
<b>CO3</b>   E	Build and compare	various Deep Leari	ning model for solvir	g real world application	Create
Module		M			
mouule			ndule Contents		Hours
	Fundamentals of		odule Contents		Hours
		of Neural Networl	ks:	rrons, Perceptron Learnir	
т	McCulloch Pitts	of Neural Networl Neuron, Thresho	ks: Iding Logic, Percept	rons, Perceptron Learnin entation Power of MLP	lg
I	McCulloch Pitts Algorithm, Mul	of Neural Networl Neuron, Thresho Itilayer Perceptror	ks: Iding Logic, Percept 1s (MLPs), Represe	entation Power of MLP	lg s, 7
Ι	McCulloch Pitts Algorithm, Mul Sigmoid Neur	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient	ks: Iding Logic, Percept 1s (MLPs), Represe Descent, Feedforv	ntation Power of MLP vard Neural Network	lg s, 7
I	McCulloch Pitts Algorithm, Mul Sigmoid Neur	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient	ks: Iding Logic, Percept 1s (MLPs), Represe	ntation Power of MLP vard Neural Network	lg s, 7
	McCulloch Pitts Algorithm, Mul Sigmoid Neur Representation H algorithm. <b>Optimizations i</b>	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw n Gradient Desce	ks: Iding Logic, Percept as (MLPs), Represe Descent, Feedforv ard Neural Networks nt:	ntation Power of MLP ward Neural Network Backpropagation	1g s, 7 s, 7
I	McCulloch Pitts Algorithm, Mul Sigmoid Neur Representation F algorithm. <b>Optimizations i</b> Gradient Descen	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw n Gradient Desce It (GD), Momentur	ks: Iding Logic, Percept is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nestero	entation Power of MLP ward Neural Network Backpropagation	lg s, 7
	McCulloch Pitts Algorithm, Mul Sigmoid Neur Representation F algorithm. <b>Optimizations i</b> Gradient Descen Stochastic GD, A	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw n Gradient Desce It (GD), Momentur AdaGrad, RMSPro	ks: Iding Logic, Percept as (MLPs), Represe Descent, Feedforv ard Neural Networks nt:	entation Power of MLP ward Neural Network Backpropagation	1g s, 7 s, 7
	McCulloch Pitts Algorithm, Mul Sigmoid Neur Representation H algorithm. <b>Optimizations i</b> Gradient Descen Stochastic GD, A <b>Regularization:</b>	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro	ks: Iding Logic, Percept ns (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterc p, Adam, Bais correc	entation Power of MLP ward Neural Network . Backpropagation by Accelerated GD, etion in Adam.	1g s, 7 s, 7 6
П	McCulloch Pitts Algorithm, Mul Sigmoid Neur Representation F algorithm. <b>Optimizations i</b> Gradient Descen Stochastic GD, A <b>Regularization:</b> Regularization:	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterc p, Adam, Bais correct le off, L2 regularizat	entation Power of MLP ward Neural Network . Backpropagation ov Accelerated GD, etion in Adam.	1g s, s, 7 6
	McCulloch PittsAlgorithm, MullSigmoid NeurRepresentation Halgorithm.Optimizations iGradient DescentStochastic GD, ARegularization: Iset augmentation	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad n, Parameter sharin	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterc p, Adam, Bais correc le off, L2 regularizati g and tying, Injecting	entation Power of MLP ward Neural Network . Backpropagation ov Accelerated GD, etion in Adam. fon, Early stopping, Data- g noise at input, Ensemble	1g s, s, 7 6
П	McCulloch PittsAlgorithm, MullSigmoid NeurRepresentation Halgorithm.Optimizations iGradient DescentStochastic GD, ARegularization: Hset augmentationmethods, Droport	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad n, Parameter sharin ut. Greedy Layer w	ks: lding Logic, Percept ns (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterc p, Adam, Bais correc le off, L2 regularizati g and tying, Injecting vise Pre-training, Bet	entation Power of MLP ward Neural Network . Backpropagation ov Accelerated GD, etion in Adam. tion, Early stopping, Data- g noise at input, Ensemble ter activation functions,	1g s, 7 s, 7 6
П	McCulloch PittsAlgorithm, MullSigmoid NeurRepresentation Halgorithm.Optimizations iGradient DescentStochastic GD, ARegularization:Regularization:set augmentationmethods, DroportBetter weight initial	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad I, Parameter sharin ut. Greedy Layer w Itialization method	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterc p, Adam, Bais correc le off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati	entation Power of MLP ward Neural Network . Backpropagation ov Accelerated GD, etion in Adam. don, Early stopping, Data- g noise at input, Ensemble ter activation functions, on.	1g s, 7 s, 7 6
П	<ul> <li>McCulloch Pitts</li> <li>Algorithm, Mull</li> <li>Sigmoid Neur</li> <li>Representation F</li> <li>algorithm.</li> <li><b>Optimizations i</b></li> <li>Gradient Descent</li> <li>Stochastic GD, A</li> <li><b>Regularization:</b></li> <li>Regularization: I</li> <li>set augmentation</li> <li>methods, Droport</li> <li>Better weight initial</li> </ul>	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad n, Parameter sharin ut. Greedy Layer w Itialization method for word encoding	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: m Based GD, Nesterco p, Adam, Bais correct Ie off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language	entation Power of MLP ward Neural Network . Backpropagation ov Accelerated GD, etion in Adam. fon, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b>	1g s, 7 s, 7 6
Ш	McCulloch PittsAlgorithm, MullSigmoid NeurRepresentation Halgorithm.Optimizations iGradient DescentStochastic GD, ARegularization: Iset augmentationmethods, DroportBetter weight initDeep LearningEigen values and	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad n, Parameter sharin ut. Greedy Layer w Itialization method for word encodin I eigen vectors, Ba	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterc p, Adam, Bais correc le off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language sis, Principal Compo	entation Power of MLP ward Neural Network . Backpropagation ov Accelerated GD, etion in Adam. ion, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b> nent Analysis and its	19 8, 7 6 6 7
П	McCulloch PittsAlgorithm, MullSigmoid NeurRepresentation Halgorithm.Optimizations iGradient DescentStochastic GD, ARegularization:Regularization:set augmentationmethods, DroportBetter weight initDeep LearningEigen values andinterpretations,	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad I, Parameter sharin at. Greedy Layer w Itialization method for word encoding I eigen vectors, Ba Singular Value	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterc p, Adam, Bais correct le off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language sis, Principal Compo ue Decompositior	entation Power of MLP vard Neural Network . Backpropagation ov Accelerated GD, etion in Adam. don, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b> nent Analysis and its a, Learning Vectoria	19 8, 7 6 6 7
Ш	<ul> <li>McCulloch Pitts</li> <li>Algorithm, Mull</li> <li>Sigmoid Neur</li> <li>Representation F</li> <li>algorithm.</li> <li><b>Optimizations i</b></li> <li>Gradient Descension</li> <li>Stochastic GD, A</li> <li><b>Regularization:</b></li> <li>Regularization: Inset augmentation</li> <li>methods, Droport</li> <li>Better weight initial</li> <li><b>Deep Learning</b></li> <li>Eigen values and</li> <li>interpretations,</li> <li>Representations</li> </ul>	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad n, Parameter sharin ut. Greedy Layer w Itialization method for word encoding I eigen vectors, Ba Singular Valu Of Words: One ho	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterc p, Adam, Bais correct le off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language sis, Principal Compo ue Decompositior	entation Power of MLP ward Neural Network . Backpropagation ov Accelerated GD, etion in Adam. ion, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b> nent Analysis and its	19 8, 7 6 6 7
Ш	McCulloch Pitts Algorithm, Mul Sigmoid Neur Representation F algorithm. <b>Optimizations i</b> Gradient Descen Stochastic GD, A <b>Regularization:</b> Regularization: set augmentation methods, Dropot Better weight init Deep Learning Eigen values and interpretations, Representations	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad n, Parameter sharin ut. Greedy Layer w Itialization method for word encoding I eigen vectors, Ba Singular Valu Of Words: One ho ion.	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: m Based GD, Nesterce p, Adam, Bais correct Ie off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language sis, Principal Compo ue Decomposition t representation of w	entation Power of MLP ward Neural Network . Backpropagation ov Accelerated GD, etion in Adam. don, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b> nent Analysis and its a, Learning Vectoria ords, SVD for learning	19 8, 7 6 6 7
II III IV	<ul> <li>McCulloch Pitts Algorithm, Mull Sigmoid Neur Representation F algorithm.</li> <li>Optimizations i Gradient Descen Stochastic GD, A</li> <li>Regularization: I set augmentation methods, Dropor Better weight init</li> <li>Deep Learning Eigen values and interpretations, Representations word representat</li> </ul>	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad I, Parameter sharin at. Greedy Layer w Itialization method for word encoding I eigen vectors, Ba Singular Valu Of Words: One ho ion.	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterc p, Adam, Bais correct le off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language sis, Principal Compo ue Decomposition t representation of w for Computer Vision	entation Power of MLP vard Neural Network . Backpropagation ov Accelerated GD, etion in Adam. ion, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b> nent Analysis and its a, Learning Vectoria ords, SVD for learning <b>n:</b>	19 s, 7 6 6 2 2 3 1 7
Ш	McCulloch PittsAlgorithm, MullSigmoid NeurRepresentation Falgorithm.Optimizations iGradient DescentStochastic GD, ARegularization:Regularization:set augmentationmethods, DroportBetter weight initDeep LearningEigen values andinterpretations,Representationsword representationConvolutional N	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad h, Parameter sharin ut. Greedy Layer w Itialization method for word encoding I eigen vectors, Ba Singular Valu Of Words: One ho ion. Neural Networks, L	ks: lding Logic, Percept is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterco p, Adam, Bais correct le off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language sis, Principal Compo ue Decomposition t representation of w for Computer Vision eNet, AlexNet, ZF-N	entation Power of MLP ward Neural Network . Backpropagation ov Accelerated GD, etion in Adam. don, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b> nent Analysis and its a, Learning Vectoria ords, SVD for learning n: let, VGGNet, GoogLeNet	19 s, 7 6 6 2 7 11 7
II III IV	<ul> <li>McCulloch Pitts</li> <li>Algorithm, Mull</li> <li>Sigmoid Neur</li> <li>Representation F</li> <li>algorithm.</li> <li><b>Optimizations i</b></li> <li>Gradient Descent</li> <li>Stochastic GD, A</li> <li><b>Regularization:</b> I</li> <li>set augmentation</li> <li>Better weight initiation</li> <li><b>Deep Learning</b></li> <li>Eigen values and</li> <li>interpretations,</li> <li>Representations</li> <li>word representation</li> <li>Convolutional N</li> <li>ResNet, Visualization</li> </ul>	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad n, Parameter sharin ut. Greedy Layer w Itialization method for word encoding I eigen vectors, Ba Singular Valu Of Words: One ho ion. Neural Networks, Li- zing Convolutional	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: m Based GD, Nesterce p, Adam, Bais correct Ie off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language sis, Principal Compo- ue Decomposition t representation of w for Computer Vision eNet, AlexNet, ZF-N Neural Networks, G	entation Power of MLP ward Neural Network . Backpropagation by Accelerated GD, etion in Adam. fon, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b> nent Analysis and its a, Learning Vectoria ords, SVD for learning <b>n:</b> let, VGGNet, GoogLeNet uided Backpropagation,	19 s, 7 6 6 2 2 3 1 7
II III IV	<ul> <li>McCulloch Pitts Algorithm, Mull Sigmoid Neur Representation F algorithm.</li> <li><b>Optimizations i</b> Gradient Descen Stochastic GD, A</li> <li><b>Regularization:</b> Regularization: I set augmentation methods, Dropot Better weight init</li> <li><b>Deep Learning</b> Eigen values and interpretations, Representations word representations</li> <li>Convolutional N ResNet, Visualiz Deep Dream, De</li> </ul>	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad n, Parameter sharin ut. Greedy Layer w Itialization method for word encoding I eigen vectors, Ba Singular Valu Of Words: One ho ion. Neural Networks, La ring Convolutional per Art, Fooling Co	ks: lding Logic, Percept is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterco p, Adam, Bais correct le off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language sis, Principal Compo ue Decomposition t representation of w for Computer Vision eNet, AlexNet, ZF-N	entation Power of MLP ward Neural Network . Backpropagation by Accelerated GD, etion in Adam. fon, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b> nent Analysis and its a, Learning Vectoria ords, SVD for learning <b>n:</b> let, VGGNet, GoogLeNet uided Backpropagation,	19 s, 7 6 6 2 7 11 7
II III IV	<ul> <li>McCulloch Pitts Algorithm, Mull Sigmoid Neur Representation F algorithm.</li> <li><b>Optimizations i</b> Gradient Descen Stochastic GD, A</li> <li><b>Regularization:</b> Regularization: I set augmentation methods, Dropor Better weight init</li> <li><b>Deep Learning</b> Eigen values and interpretations, Representations word representat</li> <li><b>Convolutional N</b> ResNet, Visualiz Deep Dream, De</li> <li><b>Recurrent Neur</b></li> </ul>	of Neural Networl Neuron, Thresho Itilayer Perceptror ons, Gradient Power of Feedforw <b>n Gradient Desce</b> It (GD), Momentur AdaGrad, RMSPro Bias Variance Trad A parameter sharin ut. Greedy Layer w Itialization method for word encoding I eigen vectors, Ba Singular Valu Of Words: One ho ion. Neural Networks for leural Networks, La cing Convolutional teep Art, Fooling Cor- ral Networks:	ks: Iding Logic, Percept Is (MLPs), Represe Descent, Feedforv ard Neural Networks nt: n Based GD, Nesterco p, Adam, Bais correct le off, L2 regularizati g and tying, Injecting vise Pre-training, Bet s, Batch Normalizati g-Natural Language sis, Principal Compo ue Decomposition t representation of w for Computer Vision eNet, AlexNet, ZF-N Neural Networks, G onvolutional Neural I	entation Power of MLP ward Neural Network . Backpropagation by Accelerated GD, etion in Adam. fon, Early stopping, Data- g noise at input, Ensemble ter activation functions, on. e <b>Processing:</b> nent Analysis and its a, Learning Vectoria ords, SVD for learning <b>n:</b> let, VGGNet, GoogLeNet uided Backpropagation,	19     7       10     6       10     7       11     7       11     7

	Text Books						
1	Aurelien Geron, "Hands-On Machine Learning with Scikit-Learn, Keras and Tensor Flow:						
	Concepts, Tools and Techniques to Build Intelligent Systems", 2 <sup>nd</sup> Edition, O"Reilly, 2019						
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 Press						
1	Cambridge, Massachusetts London, England, 2017						
	Useful Links						
1	All Modules taken from below link						
	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.

Assessment Plan based on Bloom's Taxonomy Level									
Bloom's Taxonomy Level	MSE	ISE	ESE	Total					
Remember	To be used minimum								
Understand	To be used minimum								
Apply	10	10	20	40					
Analyze	10	5	10	25					
Evaluate	10	5	10	25					
Create			10	10					
Total	30	20	50	100					

		V		ge of Engineer		
			1	Aided Autonomous Ins	titute)	
				AY 2022-23		
				rse Information		
Progra			M. Tech. (CS and	,		
Class,			First Year M. Tech	i., Sem II		
Cours			6IT538	4.0.11		
Cours	e Nam	e		ve - 4: Geographica	I Information System	& Remote Sensing
<b>D</b> '	1.D	• • 4	-Interdisciplinary	·····		
Desire	ed Req	uisites:	Fundamentals of I	nage processing		
Te	eachin	g Scheme		Examination	Scheme (Marks)	
Lectur		3 Hrs/week	MSE	ISE	ESE	Total
Tutori	ial	-	30	20	50	100
Practi	cal	-				
Intera	ction	-		Cre	dits: 2	
			·			
			Co	urse Objectives		
1		npart knowledg ms (GIS)	e of the fundamenta	ls of Remote Sensin	g (RS) and geograph	ical information
2			miliar with Data and	l Data Products in R	S and GIS.	
3	To ac	quaint students	s advantages and app	plications of RS and	GIS	
4						
		Co	ourse Outcomes (C	O) with Bloom's Ta	xonomy Level	
At the	end of		students will be abl	/	v	
CO1				concepts in RS and	GIS	Understand
CO2		pret and Apply base manageme		data and demonstra	te GIS data and GIS	Apply
CO3	1	<u> </u>		ducts of RS and GIS	1	Analyse
					design solution for	
CO4		us interdiscipli				
Modu	ıle		Modul	e Contents		Hours
Ι	Concepts and Foundation of Remote SensingIntroduction, Remote Sensing System, Electromagnetic Energy, Electromagnetic Spectrum and its Characteristics, Energy Interaction in the Atmosphere and with the Earth's Surface, Resolution in Remote Sensing, Broad Classifications of Sensors and Platform, Earth Observation Satellite and Sensors, Data Reception, Transmission and Processing, Remote Sensing				7	
II	Data and Data Products.Satellite Image Interpretation and ProcessingInterpretation Procedure and Elements, Interpretation strategies and keys,IIDigital Image processing and Image Analysis steps, Image Rectification and Restoration, Image Enhancement, Spatial Filtering, Image Transformation, Image Classification and Analysis.					7
III	A L U	<b>pplications of</b> and use Land rban Growth, H	<b>Remote Sensing</b> Cover Mapping, C Flood Plain Mapping	rop Inventory, Grou , Disaster Managem	ınd Water Mapping, ent.	6
IV	Ir Ir	nage Processin	eographical concepts g system and GIS,		Difference between ges and their salient SPS	

v	GIS Data GIS Data types and Data Representation, Data Acquisition, Georeferencing	
l v	of GIS Data, Raster and Vector data, Raster to Vector conversion, Remote Sensing Data in GIS, GIS Database and Database Management System	7
	GIS Spatial Data Analysis and Applications	
	Measurements in GIS-Lengths, Perimeters, and Areas, Queries,	
VI		
V1	Spatial Interpolation, Analysis of Surfaces, Network Analysis, GIS	6
	Applications	
	Text Books	
1	Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing Ho	use. 2008
2	Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Info Prentice Hall India. 20012	ormation System",
	References	
1	Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John W Edition. 2012	iley and Sons, 6th
2	Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition	n. 2010
	Useful Links	
1	NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08	
1	https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10	
2	https://www.usgs.gov	
3	https://bhuvan.nrsc.gov.in/bhuvan_links.php#	

	CO-PO Mapping										
	Programme Outcomes (PO)										
	1 2 3 4 5 6										
CO1			2								
CO2			2								
CO3	2			2							
<b>CO4</b>	3			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.

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)

	Assessment Plan based on Bloom's Taxonomy Level (Marks)					
Bloom's Taxonomy Level MSE ISE ESE					Total	
1	Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
2	Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum	
3	Apply	10	10	20	40	
4	Analyze	10	5	10	25	
5	Evaluate	10	5	10	25	
6	Create			10	10	
	Total	30	20	50	100	

	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	6IT574
Course Name	Professional Elective – 3-Distributed Operating Systems Lab
Desired Requisites:	

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

	Course Objectives	
1	To elaborate the models of Distributed Systems	
2	To implement the models of Distributed Systems	
3	To describe the problem to solve using Deep Learning	
	Course Outcomes (CO) with Bloom's Taxonomy Level	
At the	end of the course, the students will be able to,	
CO1	Demonstrate Learning models for suitable applications	Apply
CO2	Implement distributed network communication systems	Apply
CO3	Apply security techniques to solve real world distributed applications	Evaluate

# 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. Study of Case Studies: SUN RPC, DEC RPC Clock synchronization and related algorithms
- 1. Implement concurrent day-time client-server application.
- 2. Configure following options on server socket and tests them: SO\_KEEPALIVE, SO\_LINGER, SO\_SNDBUF, SO\_RCVBUF, TCP\_NODELAY
- 3. Incrementing a counter in shared memory
- 4. Create CORBA based server-client application
- 5. Design XML Schema and XML instance document
- 6. Implement Trigonometric Service that implements sin, and cos operations.
- 7. Configuring reliability and security options
- 8. Write a program to Test open source ESB using web service.

Not limited to this list; Instructor can add more based on the theory course syllabus

	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.
	References
1	Sunita Mahajan & Seema Shah, "Distributed Computing", Second Edition, OXFORD, 2013
	Useful Links

1	https://nptel.ac.in/courses/106/106/106106107/ https://nptel.ac.in/courses/106/106/106106168/						
			CO-F	PO Mapping			
		Programme Outcomes (PO)					
		PO1	PO2	PO3	PO4	PO5	PO6
	CO1	1		3			2
	CO2		1		2		
	CO3	1		1			

	Asses	ssment		
			on.	
Based on	Conducted by	Typical Schedule	Marks	
Lab activities,	Lab Course	During Week 1 to Week 6	30	
attendance, journal	Faculty	Marks Submission at the end of Week 6		
Lab activities,	Lab Course	During Week 7 to Week 12	20	
attendance, journal	Faculty	Marks Submission at the end of Week 12	30	
Lab activities,	Lab Course	During Week 13	40	
attendance, journal	Faculty	Marks Submission at the end of Week 13	40	
	E is a separate head of Based on Lab activities, attendance, journal Lab activities, attendance, journal Lab activities,	ee components of lab assessment, LA1,E is a separate head of passing. LA1, LABased onConducted byLab activities, attendance, journalLab CourseLab activities, Lab activities, Lab CourseLab Course	Based onConducted byTypical ScheduleBased onConducted byTypical ScheduleLab activities,Lab CourseDuring Week 1 to Week 6attendance, journalFacultyMarks Submission at the end of Week 6Lab activities,Lab CourseDuring Week 7 to Week 12Lab activities,Lab CourseDuring Week 13	

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.

Assessn	Assessment Plan based on Bloom's Taxonomy level					
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Apply	10	10	10	30		
Analyze	10	10	10	30		
Evaluate	5	5	10	20		
Create	5	5	10	20		
Total	30	30	40	100		

	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	6IT575
Course Name	Professional Elective – 3- System Programming lab
<b>Desired Requisites:</b>	Data Structures and Operating Systems

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

	Course Objectives	
1	To elaborate the concepts in systems programming.	
2	To analyze the structure and design of assemblers, linkers and loaders.	
3	To use high level programming languages to describe system programs	
	Course Outcomes (CO) with Bloom's Taxonomy Level	
At the	end of the course, the students will be able to,	
CO1	Demonstrate the working of system programs	Analyze
CO2	Study the working of parsers of compilers	Analyze
CO3	Compare the static and dynamic linking	Analyze

	List of Experiments / Lab Activities	
	f Experiments:	
	ties are to be carried out individually.	
Each s	tudent will perform the activity based on course on following areas.	
1.	. Create a menu driven interface for	
	a) Displaying contents of a file page wise	
	b) Counting vowels, characters, and lines in a file	
	c) Copying a file	
2.	Write a program to check blance parenthesis of a given program. Also	
	generate the error report.	
3.	. Write a program to create symbol table for a given assembly language	
	program.	
4.	Write a program to create symbol table for a given high-level language	
	program.	
5.	. Implementation of single pass assembler on a limited set of instructions.	
6.	. Exploring various features of debug command.	
7.	Use of lax and YACC tools.	
Not lin	nited to this list; Instructor can add more based on the theory course syllabus	
	Text Books	
	M Dhamdhere, "System Programming", McGraw Hill Publication, second revised edi 009	tion,
	rimanta Pal, "System Programming", Oxford University Press, 2011	

3	R.K. Maurya & A. Godbole, "System Programming and Compiler Construction", Dreamtech Press, 2014
	References
	Kelerences
1	Leland L. Beck, "System Software – An Introduction to Systems Programming", Pearson Education Asia,3 <sup>rd</sup> edition, 2000
2	Santanu Chattopadhyay, "System Software", Prentice-Hall India, 2007
3	R K Maurya and Anand A Godbole "System Programming and Compiler Construction (Includes Labs)", Dreamtech Press, 2014
	Useful Links
1	www.cs.jhu.edu/~scott/pl/lectures/parsing.html
2	www.en.wikipedia.org/wiki/System_programming
3	https://nptel.ac.in/courses/106/106/106106197/

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

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	50			
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30			
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50			
Lab ESE	Lab activities,	Lab Course	During Week 13	40			
Lab ESE	attendance, journal	Faculty	Marks Submission at the end of Week 13	40			
Week 1 indic	ates starting week of a	semester. Lab ac	tivities/Lab performance shall include perfor	ming			

Week I 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.

Assessment Plan based on Bloom's Taxonomy level						
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Apply	10	10	10	30		
Analyze	10	10	10	30		
Evaluate	5	5	10	20		
Create	5	5	10	20		
Total	30	30	40	100		

			lege of Engineeri					
	(Government Aided Autonomous Institute)							
			AY 2023-24					
		Cou	rse Information					
Programme		M.Tech. (CS and	IT)					
Class, Semes	ter	First Year M. Tec	h, Sem II					
Course Code	2	6IT576						
Course Nam	e	Professional Elec	tive – 3-Mathemati	ics for Machine Lea	rning Lab			
<b>Desired Req</b>	uisites:	Probability, Linea	ar Algebra and Pro	gramming				
Teaching	g Scheme		Examination S	cheme (Marks)				
Lecture	-	LA1	LA2	Lab ESE	Total			
Tutorial	-	30	30	40	100			
Practical	2 Hrs/Week							
Interaction	-		Cı	redits: 1				
		Со	urse Objectives					
1 To co	ompare variou	is techniques in M	Iachine Learning					
2 To el	aborate metho	odologies for vari	ous application a	reas of Machine L	earning			
3 To il	lustrate variou	is applications in	Machine Learnin	g				
3 To illustrate various applications in Machine Learning Course Outcomes (CO) with Bloom's Taxonomy Level								

At the	At the end of the course, the students will be able to,					
<b>CO1</b>	To Understand the concept of Linear Algebra and Probabilities.	Understand				
CO2	To apply various algorithms of Machine Learning.	Apply				
<b>CO3</b>	To implement code for various applications of Machine Learning	Implement				
		1				

# List of Experiments / Lab Activities

# List of Experiments:

1

1

- 1 Write a program in Python to implement simple facts of basic Linear Algebra.
- 2 Write a program in Python to implement simple facts of Matrices and Vectors.
- 3 Write a program in Python to calculate the eigenvalues and eigenvectors, SVD.
- 4 Write a program in Python to implement PCA for dimensionality reduction.
- 5 Write a Program to test the basic concepts of calculus.
- 6 Write a program in Python to implement of linear discriminant analysis.
- 7 Write a program in Python to implement of Gradient Descent algorithm from scratch.
- 8 Write a Program to Implement Support Vector Machine on MNIST dataset.
- 9 Write a program in Python to implement Gram Schmidt algorithm.
- 10 Write a program to implement a data compression.

Activities are to be carried out individually.

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

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**

Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow"O'Reilly Media, Inc., 2nd Edition, 2019

References

 
 Useful Links

 1
 https://onlinecourses.nptel.ac.in/noc21\_ma38/preview (NPTEL/SWAYAM course by Prof. By Prof. Sanjeev Kumar, Prof. S. K. Gupta | IIT Roorkee )

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

Assessment								
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluation	ion.				
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	50				
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30				
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
Lab ESE	Lab activities,	Lab Course	During Week 13	40				
Lab ESE	attendance, journal	Faculty	Marks Submission at the end of Week 13	40				
Week 1 indic	ates starting week of a	semester. Lahac	tivities/Lab performance shall include perfor	mino				

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.

Assessment Plan based on Bloom's Taxonomy level						
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		
Remember	To be used minimum					
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Apply	10	10	10	30		
Analyze	10	10	10	30		
Evaluate	5	5	10	20		
Create	5	5	10	20		
Total	30	30	40	100		

		Wa		of Engineering, San	ngli		
				2020-21			
				Information			
Progra	amme		M.Tech. (CS and IT	)			
	Semest	er	First Year M. Tech.,	Sem II			
Course	e Code		6IT 534				
Cours	e Name	;	Professional Elective	e – 3- Soft Computing and	applications	Lab	
Desire	d Requ	isites:	Basic knowledge of				
	_						
Т	eaching	g Scheme		Examination Scheme	(Marks)		
Lectur		3 Hrs/week	T1	T2	ESE	Total	
Futori		-	20	10	60	100	
Practi		-					
Intera	ction	-		Credits: 3			
			~				
1	TC	4		<b>Objectives</b>		1.1 1.1	
1				t computing based solution			
2		U U	of non-traditional tech , genetic algorithms	nologies and fundamenta	is of artificial	neural netw	orks
3			<u> </u>	w and CA			
3		cuss hybrid app	lications of ANN, Fuz				
		Com	rsa Autoomos (CA) u	ith Bloom's Taxonomy	Lovol		
CO1	analy		``´´	r roles in building intellig		Analy	
CO2	probl	• •	gic and neural networks techniques to solve various engineering Evaluate				
CO3			olications using geneti	c algorithms and hybrid a	pproaches	Creat	e
	build	prototyping upp	sheatons asing geneti	e argoritimis and rigoria a	pprouenes	Creat	
			Lab activities	/Experiments		Ho	urs
	10/12	2 experiments u	sing MATLAB and fo				
		al Nework Too		C			
	1.Cre	ating a Neural N	Jetwork				
	2. Use	e various Comm	ands of the Neural N	etwork Toolbox			
				etwork Graphical User In	terface Toolb	ox	
			AB Toolbox for				
			y Logic Toolbox	·		(	6
	-	•	hk Blocks in Fuzzy Lo				
			using Fuzzy logic GU				
		0	MATLAB Toolbox fo	<b>r</b> netic Algorithm Comman	łe		
				Algorithm Graphical User			
				nore based on the theory of		s	
	1.001 11			tore oused on the theory (	saise synabu	~•	
			Тех	t Books			
1	Rajas	ekaran S., Vijav		eural Networks, Fuzzy L	ogic and Gene	etic	
1		ithms", PHI, 20		, ,	~		
2				urville, "Deep Learning",	MIT Press e-	book	
			Ref	erences			
1	PHI, 2	2003		i Mizutani, "Neuro-Fuzzy			
2	Georg	ge J. Klir and Bo	o Yuan, "Fuzzy Sets a	nd Fuzzy Logic: Theory a	nd Applicatio	ns", PHI, 19	95
			Use	ul Links			
			USC				

3

CO-PO Mapping							
		Programme Outcomes (PO)					
	PO1	PO2	PO3	PO4	PO5	PO6	
C01	2			3			
CO2			2	2		2	
CO3	2		2	2		2	

Assessment							
There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluation	on.			
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	50			
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30			
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50			
Lab ESE	Lab activities,	Lab Course	During Week 13	40			
	attendance, journal	Faculty	Marks Submission at the end of Week 13	40			
XX7 1 1 1 1	1 0	· T 1		•			

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.

Assessment Plan based on Bloom's Taxonomy level						
<b>Bloom's Taxonomy Level</b>	LA1	LA2	Lab ESE	Total		
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Apply	10	10	10	30		
Analyze	10	10	10	30		
Evaluate	5	5	10	20		
Create	5	5	10	20		
Total	30	30	40	100		

	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	6IT578						
Course Name	Professional Elective – 4- Big Data Computing Lab						
Desired Requisites:	Desired Requisites: Cloud computing						

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

	Course Objectives					
1	To demonstrate the big data computing using Apache Hadoop					
2	To experiment the distributed file system and its interfacing					
3	<b>3</b> To solve real world challenges using big data analytics					
	Course Outcomes (CO) with Bloom's Taxonomy Level					
At the	end of the course, the students will be able to,					
CO1	Apply the concepts of big data computing for data analytics	Apply				
CO2	Identify the characteristics of datasets in big data	Apply				
<b>CO3</b>	Evaluate scaling techniques to compute the big data	Evaluate				

# 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 following file management tasks in Hadoop: Adding Files and Directories, Retrieving Files, Deleting Files
- 2. Exploring various shell commands in Hadoop.
- 3. Industry Problem Statement( if any)
- 4. To implement basic Word Count Map-Reduce program to understand Map Reduce Paradigm with number of occurrences of each word appearing in an input file and perform a MapReduce Job for word search count (look for specific keywords in a file).
- 5. Implement Map Reduce program that mines weather data (or any real-time data set). Weather sensors collecting data every hour at many locations across the globe gather large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented

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	Prajapati Vignesh, "Big Data Analytics with R and Hadoop", Packt Publishing, 1st Edition, 2013					
2	Minelli Michael, Chambers Michehe, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", Ambiga Dhiraj, Wiely CIO Series, 1 <sup>st</sup> Edition, 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, 1<sup>st</sup> Edition, 2012

Useful Links

Module I, II, III, IV, V, VI https://nptel.ac.in/courses/106/104/106104189/

1

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

Assessment								
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluation	ion.				
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	50				
LAC	Lab activities,	Lab Course	During Week 7 to Week 12	20				
LA2 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 indic	. 5		tivities/Lab performance shall include perfor	mina				

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.

Assessment Plan based on Bloom's Taxonomy level						
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Apply	10	10	10	30		
Analyze	10	10	10	30		
Evaluate	5	5	10	20		
Create	5	5	10	20		
Total	30	30	40	100		

			Walchand Colle	ge of Engineering,	Sangli	
			(Government Aid	ded Autonomous Ins	stitute)	
			А	Y 2022-23		
			Cour	se Information		
Programme M. Tech. (CS and IT)						
Class,	Semes	ster	First Year M. Tech	n., Sem II		
Cours	e Code	9	6IT579			
Cours	e Nam	e	Professional Electi	ive – 4- High Perfor	mance Computing lab	
Desire	d Req	uisites:	Computer Algorith	ım		
			·			
Teaching Scheme Examination Scheme (Marks)						
Lectu	re	-	LA1	LA2	ESE	Total
Tutor	ial	-	30	30	40	100
Practi	cal	2 Hrs/Week			·	
Intera	ction	-		Crec	lits: 1	
			·			
			Cou	rse Objectives		
1	To el	aborate the conc	cepts of process and	thread in high perfo	ormance computing	
2	To ev	aluate the perfo	rmance of parallel p	programs with seque	ntial program	
3	To co	mpare multi-co	re and many-core ar	chitectures		
			rse Outcomes (CO	,	konomy Level	
			students will be able			
<b>CO1</b>	Appl	y the parallel alg	gorithm to solve the	problem		Apply
CO2	Imple	ement the paralle	el algorithms for per	formance paramete	rs	Apply

Create

# List of Experiments / Lab Activities

Develop the appropriate parallel algorithm to speed up the computation

# Lab Activities:

CO3

Activities are to be carried out individually.

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

Implementations are expected using OpenACC platform

- 1. Implement PI Calculation.
- 2. Implement Matrix Transpose Program.
- 3. Write a program to find the factorial of a given number.
- 4. Write a program to find squares of array elements.
- 5. Implement odd-even Sort.
- 6. Implement Quick Sort.
- 7. Program on vector computation.
- 8. Study of Profiling tools.

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	Anath Grama, Ansul Gupta, George Karypis, Vipin Kumar, "Introduction to parallel					
1	computing", Second Edition, Pearson Education					
	·					
	References					
1	Horrowitz, SahniRajasekaran, "Computer Algorithms", Computer Science, W. H. Freeman and					
1	company Press, New York,					
	· · · ·					
	Useful Links					

1	https://www.coursera.org/learn/parprog1?ranMID=40328&ranEAID=*GqSdLGGurk&ranSiteID =.GqSdLGGurk-ntwHfWI_xX32aIgZXdr9Ug&siteID=.GqSdLGGurk- ntwHfWI_xX32aIgZXdr9Ug&utm_content=10&utm_medium=partners&utm_source=linkshare& utm_campaign=*GqSdLGGurk#syllabus						
			CO-PO I	Mapping			
			]	Programme (	Outcomes (P	0)	
		PO1	PO2	PO3	PO4	PO5	PO6
	CO1			3			
	CO2 2 2 1						
	CO3         1         2						

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	50				
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30				
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
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.

Assessment Plan based on Bloom's Taxonomy level							
<b>Bloom's Taxonomy Level</b>	LA1	LA2	Lab ESE	Total			
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum			
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum			
Apply	10	10	10	30			
Analyze	10	10	10	30			
Evaluate	5	5	10	20			
Create	5	5	10	20			
Total	30	30	40	100			

Programme		(	Course Informat	t and			
Programme		,	Course morma	1011			
	M. Tech.	M. Tech. (CS and IT)					
Class, Seme	ster First Yea	irst Year M. Tech., Sem II					
Course Cod	le 6IT580						
Course Nan	ne Professio	nal Elective – 4-	Deep Learning la	lb			
Desired	Mathema	tics, Machine learn	ing				
<b>Requisites:</b>							
ті	<u> </u>		<b>.</b>				
	ng Scheme	TAI		ation Scheme (Marl			
Lecture	-	LA1	LA2	ESE	Total		
Tutorial	-	3 0	30	40	100		
Practical	2	0					
i i actical	Hrs/Week						
Interaction	-			Credits: 1			
		I					
			<b>Course Objectiv</b>	/es			
		Deep Learning					
		ns of Deep Learni		nce parameters			
To interpret		solve using Deep					
A ( (1 1			· /	m's Taxonomy Leve	el		
		e students will be			A		
Apply the L	eep Learning I	nodel for suitable	applications		Apply		
Implement of	leep neural net	work systems			Apply		
1	I	5			11.5		
Build Deep	Learning mode	el for solving real	world application	1	Evaluate		
		L ist of F	Experiments / La	h Activities			
List of Even	mimonta		xperments / La	DACUVILLES			
List of Expe		out individually.					
		he activity based	on course on foll	owing areas.			
		tron learning algo		8			
10. Perf	orm the gradie	nt descent algorith	hm and its types				
		rward neural netw	vorks				
	orm the AdaG						
	•	ization and ensen					
				better weight initializ	zation methods		
		component analys rds and skip gram		etation			
				F-Net VGGNet Gov	ogleNet, ResNet, etc)		
		ection using CNN					
	form YOLO alg						
20. Perform RNN algorithm							
20. Perf	onn Kiviv aigo	11(11111					

Minelli Michael, Chambers Michehe, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", Ambiga Dhiraj, Wiely CIO Series, 1st Edition, 2013

## References

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	2	2 2 2					
CO2	3 3						
CO3	1		1				

Assessment							
There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab	ESE is a separate head	l of passing. LA1,	LA2 together is treated as In-Semester Evalu	ation.			
Assessm Based on Conducted by Typical Schedule Marks							
ent							
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	50			
Lab ESE	Lab activities,	Lab Course	During Week 13	40			
	Lab 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	o course. The expe	erimental lab shall have typically 8-10 experi	ments and			
related acti	ivities if any.	-					

Ass	Assessment Plan based on Bloom's Taxonomy level							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total				
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum				
Apply	10	10	10	30				
Analyze	10	10	10	30				
Evaluate	5	5	10	20				
Create	5	5	10	20				
Total	30	30	40	100				

			Walchand College	e <b>of Engineering, S</b> d Autonomous Insti		
			1	2022-23		
				Information		
Programme M.Tech. (CS and IT)						
Class, Sen			First Year M. Tecl	h., Sem I		
Course Co	ode		6IT551			
	Course Name Professional Elective – 4- Geographical Information System & Remote Sensing - Lab					
Desired R	equisit	es:	Basic mathematics	s, Geographical Inf	ormation System & Re	emote Sensing
Teach	ing Scl	neme		Examination Sc	heme (Marks)	
Lecture		-	LA1	LA2	Lab ESE	Total
Tutorial		-	30	30	40	100
Practical		2 Hrs/Week			·	
Interactio	n	-		Cre	dits: 1	
	<u> </u>			Objectives		
1	-		alysis on raster and			
2	-		e maps using GIS s			
3	To pe		g on attribute data			
			e Outcomes (CO) v	vith Bloom's Taxo	nomy Level	
		-	ents will be able to,			
C01			ata creation and ha	indling		Apply
CO2		gn thematic ma	1			Apply
CO3	Crea	te simple GIS a	application			Create
					•	
			List of Experim	ents / Lab Activit	ies	
List of Ex	-					
		be carried out				
			activity based on c	ourse on followin	g areas.	
		Input and prepro	Software – Q GIS			
		rencing	ocessing			
		on of Map				
		of Thematic Ma	ps			
		version – Vector				
		version – Raste	,			
8. Ac	lding A	ttribute Data				
9. Qi	uerying	On Attribute Da	ata			

- 10. Vector Analysis
- 11. Raster Analysis
- 12. Map Composition

13. Simple Applications of GIS 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 document report & reference. Students should maintain activity log book containing weekly progress.

	Text Books					
1	Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Information System", Prentice Hall India.					
	References					
1	Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing House. 2008					
	Useful Links					
1						

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

Assessment						
There are three	ee components of lab a	assessment, LA1,	LA2 and Lab ESE.			
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluati	on.		
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		
1 4 2	Lab activities,	Lab Course	During Week 7 to Week 12	20		
LA2 attendance, journal Faculty Marks Submission at the end of Week 12				30		
Lab ESE	Lab activities,	Lab Course	During Week 13	40		
Lab ESELab derivities, attendance, journalLab course FacultyDuring week 154040						
Week 1 indic	ates starting week of a	semester. Lab ac	tivities/Lab performance shall include perform	ning		
experiments,	mini-project, presenta	tions, drawings, p	rogramming, and other suitable activities, as	per the natu		

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.

Assessment Plan based on Bloom's Taxonomy level						
<b>Bloom's Taxonomy Level</b>	LA1	LA2	Lab ESE	Total		
Remember	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Understand	To be used minimum	To be used minimum	To be used minimum	To be used minimum		
Apply	10	10	10	30		
Analyze	10	10	10	30		
Evaluate	5	5	10	20		
Create	5	5	10	20		
Total	30	30	40	100		