	Walchand College of Engineering, Sangli					
	AY 2024-25					
Course Information						
Program	nme	M. Tech. All Branche	es			
Class, Se	emester	First Year M. Tech.,	Sem I			
Course	Code	7IC501				
Course I	Name	Research Methodolog	ЗУ			
Desired	Requisites:	NIL				
		1				
Tea	ching Scheme		Examination Scheme (Ma	arks)		
Lecture	3 Hrs/week	MSE	ISE	ESE	Total	
Tutorial	l	30	20	50	100	
			Credits: 3			
		0				
	<u> </u>		urse Objectives	1 1	1	
1	To prepare studen	its for undergoing res	earch, identify and formulate the research process and methodolog	he research prot	plems, state the	
	To enable students to interpret the results, propose theories, suggest possible/alternative solutions, solutions, and					
2	2 nove the solution adapted_logically and analytically conclude the research findings					
To impart knowledge to analyze critically the literature and publish research in reputed conferences/					erences/	
3	3 journals.					
4	To expose students	s to research ethics, IPI	R and Patents			
	C	Course Outcomes (C	O) with Bloom's Taxonomy l	Level		
At the e	nd of the course, th	he students will be ab	le to,			
CO	Course Outcome St	tatement/s		Bloom's	Bloom's	
				Taxonomy	Taxonomy	
	<b>D</b>	1 1		Level	Description	
CO1	appropriate Engine	search solution in ea	and research methodology.	II	Apply	
	Device feasible s	solution to a researc	h problem in the respective			
CO2	engineering domai	n based on economic,	III	Analyze		
	appropriate researc	h procedures and pract	ices.			
CO3	Compose research	publications and disser	tation reports efficiently.	VI	Create	
CO4	Draft IPR and pate research work.	ent documents, as well	as copyright documentation for	VI	Create	
Modulo		N/	lula Contonta		Цолис	
wiodule	En ain ai D	MOC	iule Contents		nours	
I	I Engineering Research Process: Meaning of research problem, Sources of research problem, Criteria and Characteristics of a good research problem, Errors in selecting a research problem, Definition, scope and objectives of research problem. Approaches of investigation of solutions for research				6	

	problem, data collection, analysis, interpretation.	
п	<b>Research Methodology :</b> Problem statement formulation, resources identification for solution, Experimental and Analytical modeling, Simulations, Numerical and Statistical methods in engineering research. Hypothesis and its testing by different techniques: T-Test, Z-test etc.,	б
Ш	Research Methods:Uni and Multivariate Analysis: ANOVA, Design of Experiments/Taguchi Method,Regression Analysis. Software tools like spreadsheets.Processing and Analysis of Data: Processing Operations, Types of Analysis-Presentationand Interpretation of Data Editing, Classification and Tabulation-Interpretation. Analyseyour results and draw conclusions.	7
IV	Research Practices:Effective literature studies approaches, critical analysis, Plagiarism, Research ethics, Mendeley - Reference Management Software.Research communication- Effective Technical Writing, Writing a research article for Journal/conference paper, Technical report, Dissertation/ Thesis report writing, Software used for report writing such as word, Latex etc. Presentation techniques for 	7
v	Intellectual Property Rights (IPR): Nature of Intellectual Property: Patents, Designs, Trade and Copyright, Ownership of copyright, Term of copyright, Technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property, New developments in IPR, Traditional knowledge, Various Case Studies.	7
VI	PatentsPatent Rights: Scope of Patent Rights, Various Patent databases, Geographical Indications.Procedure for grants of patents, Patenting under Patent Cooperation Treaty (PCT).Licensing and transfer of technology. Administration of Patent System. Introduction toInternational Scenario: World Intellectual Property Organization (WIPO), Trade-RelatedAspects of Intellectual Property Rights (TRIPs), Patenting under PCT.	6
	Taythooks	
1	Kothari C. R. "Research Methodology", 5 <sup>th</sup> Edition, New Age International 2023	
2	Melville Stuart and Goddard Wayne, "Research Methodology: An Introduction for Science Students" Juta and Company Ltd, 4 <sup>th</sup> edition 2023.	& Engineering
3	Kumar Ranjit, "Research Methodology: A Step-by-Step Guide for beginners", SAGE Pub edition 2023.	plications, , 4 <sup>th</sup>

	References					
1	Merges Robert, Menell Peter, Lemley Mark, "Intellectual Property in New Technological Age", ASPEN					
Publishers, 2018.						
2	Ramappa T., "Intellectual Property Rights Under WTO", S. Chand, 2008					
3	Mayall, "Industrial Design", McGraw Hill, Oct 2021.					
4	Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2020					
5	Deepak Chopra and Neena Sondhi, "Research Methodology : Concepts and cases ", Vikas Publishing					
	House, New Delhi					
	Useful Links					
1	https://onlinecourses.nptel.ac.in/noc21_ge03/preview- Introduction to reseach					
2	https://onlinecourses.swayam2.ac.in/ntr21_ed23/preview - Academic Research & Report Writing					
	https://onlinecourses.nptel.ac.in/noc21_ge12/preview - Qualitative Research Methods And Research					
	Writing					
5	https://onlinecourses.nptel.ac.in/noc21_hs44/preview - Effective Writing					
6	https://www.scopus.com/search/form.uri?display=basic#basic					
7	https://webofscienceacademy.clarivate.com/learn					
9	https://www.wipo.int/about-wipo/en/					
10	https://iprsearch.ipindia.gov.in/publicsearch					

	CO-PO Mapping						
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1	2	2	1				
CO2	3	2	2	3	2	2	
CO3		3		3	1		
CO4				3	1		
	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High						
		Each CO of	the course must	map to at least or	ne PO.		

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)

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
	AY 2024-25					
			Course Information			
Progr	amme		M.Tech. (Computer Science and Enginee	ring)		
Class.	Semester		First Year M. Tech., Sem I	6,		
Cours	se Code		7CO501			
Cours	e Name		Advanced Data Structures			
Desire	d Roquisi	tos.	Data Structures			
Desire	lu Kequisi		Data Structures			
	Teaching	Schomo	Examination Scham	o (Morke)		
Loctu	ro	3 Hrs/wook	MSE ISE		Total	
Tuton	iel	J IIIS/ WEEK	20 20 20	<b>ESE</b>	100	
Tutor	lai	-		30	100	
			Creatis: 5			
			Course Objectives			
	Ablata	hoose energy	to data structures, understand the ADT/lib	corriage and use t	ham to design	
1	Able to C	s for a specific	nroblem	laries, and use i	nem to design	
		is for a specific	problem.	nablama		
	2 Able to understand the necessary mathematical abstractions to solve problems					
	<b>5</b> Familiarity with advanced paradigms and data structure used to solve algorithmic problems.					
4	problems	bute in choosing	g appropriate data structures and using them	1 for solving rea	al world	
	Course Outcomes (CO) with Bloom's Taxonomy Level					
At the	end of the	course, the stud	ents will be able to,			
				Bloom's	Bloom's	
CO		Cours	se Outcome Statement/s	Taxonomy	Taxonomy	
				Level	Description	
CO1	Demonst	rate Dictionarie	s and various hashing techniques	П	Understandin	
	A 1	1 4 61	• • •		g	
	Analyze	and construct SI	cip Lists.	IV	Analysing	
CO3	Develop	and analyze alg	orithms for red-black trees, B-trees and	IV	Analysing	
	Splay tre	$\frac{\text{es.}}{1}$				
004	Develop	algorithms for t	ext processing applications.		Applying	
	•				TT	
Modu			Module Contents	1	Hours	
	Dicti	onaries: Definit	ion, Dictionary Abstract Data Type, Imp	lementation of		
T	Tech	niques in Hashing	Separate Chaining, Hash Function, Com	ineer Probing	7	
1	Quad	ratic Probing I	Jouble Hashing Rehashing Extendible H	ashing Recent	/	
	trend	s in hashing	Southe Hashing, Renashing, Excharge H	asining, Recent		
	Skip	Lists: Need for	Randomizing Data Structures and Algorith	ms Search and		
П	Unda	te Operations	on Skip Lists. Probabilistic Analysis	of Skip Lists.	6	
	Deter	ministic Skip Li	ists			
	Trees	: Binary Search	Trees, AVL Trees, Red Black Trees, 2-3 7	rees, B- Trees.		
III Splay Trees.			6			

IV	Text Processing: String Operations, Brute-Force Pattern Matching, The BoyerMoore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries,6Compressed Tries, Suffix Tries, The Huffman coding algorithm.						
	Computatio	nal Geometry: Or	ne Dimensional	Range Searching	g, Two		
V	Dimensional Rar	nge Searching, Co	nstructing a Pri	iority Search Tree	e, Searching	7	
	a Priority Se	earch Tree, Priori	ty Range Trees	, Quad-trees, k-D	Trees.		
	String matching						
VI	String Operations	, Brute-Force Pat	tern Matching,	The Boyer-Moor	e Algorithm,	7	
	The Knuth-Morr	is-Pratt Algorithr	n, Predecessor	Problem, Tries	s, Trie node		
	structure and its a	pplications, Suffi	x trees and suff	ix arrays.			
			Taythooks				
	Mark Allen Weis	s "Data Structure	s and Algorithr	n Analysis in IA	VA" 3rd Editi	on	
1	Pearson,2004.	s, Duiu Shuoturo	s and ringorith	11 1 111ar y 515 111 01 1	, ora Dara	,	
2	M T Goodrich an	d Roberto Tamas	sia, Algorithm	Design, John Wil	ey, 2002.		
	References						
1	Mark Allen Weis 2004.	s, "Data Structure	s and Algorithr	n Analysis in C+	+, 2ndEdition	', Pearson,	
2	Sartaj Sahni, "Da	ta structures, Algo	orithms and Ap	plications in Java	", 2ndEdition,	, Universities	
	Press,2005						
1	1.44		Useful Links	Cana latar			
1	http://www.cise.	uii.edu/~sanni/co	psssu/presenta	turoHours tutori	la <b>nhn</b>		
2		C	O-PO Mannin		ais.php		
		 Pr	ogramme Out	s comes (PO)			
	1	2	3	4	5	6	
CO1	3	2				1	
CO2	3	1			1		
CO3	3		1				
CO4	3			2			
The streng	gth of mapping is to	be written as 1: 1	Low, 2: Mediur	n, 3: High			
Each CO	of the course must	map to at least on	e PO.				

Walchand College of Engineering, Sangli							
	(Government Atdea Autonomous Institute)						
	AI 2024-25						
Drogr	omn	20	M Tech (Computer Science and Engine	ering)			
Close	Sor	le hostor	First Voor M. Tooh, Som I	ening)			
Class,							
Cours		me	Deta Science				
Cours		ime	Data Science Drobobility and statistics, python funder	antola databas			
Desire	a Ko	equisites:	From From School From School	me (Merka)			
Lectur	ro	3 Hrs/week	MSE ISE	FSF	Total		
Tutor	iol	J IIIS/ WEEK	30 20	50 ESE	100		
1 0101	lai	-	S0 20	30	100		
			Course Objectives	<u> </u>			
1	То	amphasisa significan	ve of Data Science in real life				
2		inculcate selection of	statistical and machine learning methods	to solve real life	nrohlems		
$\frac{2}{3}$		infuse skills required	to extract and communicate useful insiste	s from data	problems.		
4		sensitize on ethical is	sues related to data	is from data.			
	10	Course	Outcomes (CO) with Bloom's Taxonon	v Level			
At the	end	of the course, the stud	ents will be able to.				
Bloom's					Bloom's		
СО		Course	e Outcome Statement/s	Taxonomy	Taxonomy		
				Level	Description		
CO1	<b>CO1</b> grasp fundamentals of data handling and extracting insights from it II				Understanding		
CO2	nra	a associated etilical con	d analysis techniques using required tool	2	Applying		
	and	d libraries to derive me	eaningful insights from raw data.	' III	rippiying		
CO3	an	alyse datasets and thei	r ethical considerations using fundamenta	1	Analysing		
	sta	tistical methods and a	lgorithms to solve real-world data science	e IV			
	pro	oblems.					
<b>CO4</b>	eva	aluate effectiveness of	of statistical methods and algorithms to		Evaluating		
	dei	rive solve real-life prol	blems as well as ethical considerations and				
Modu		ponsionnies associate	Modulo Contents		Hours		
WIOUU	ne	Introduction to Date	Noulle Contents		IIIUIIS		
		Overview of Data S	<b>cience</b> : Definition importance and app	lications. Data			
I		Science Process: Ste	ps from data collection to actionable insi	shts: Tools and	4		
Technologies: real wo			orld case study; Review of statistical meth	ods and python			
		libraries					
		Data manipulation a	and Exploratory Data Analysis				
		<b>Data Collection Met</b>	hods: Techniques and sources; Data Clea	ning: Handling			
		missing values, ou	tliers, and inconsistencies; Data Tr	ansformation:			
II		Normalization, stan	dardization, and encoding; <b>Descript</b>	ve Statistics:	8		
		Measures of central	t tendency, variability, and distribution	n; Inferential	_		
		Statistics: Hypothesi	s testing, confidence intervals, and p-valu	es			
1	Techniques to summarize and visualize data. <b>Data Visualization Tools</b> : Using						
		Techniques to summa	rize and visualize data. <b>Data Visualizatio</b>	es <b>n Tools</b> : Using			
		111 1 111 1 1 1		υ			

Ш	Supervised Machine Learning Regression: Linear regression, Multiple linear regression, Train, dev and test dataset, Binary classification: Logistic regression, Decision tree, Multi-class classification: Multiclass, Multi-label paradigms; Ensemble methods: Bagging, Boosting, Stacking; Evaluation: Performance measures, Bias- variance trade off8						
IV	Unsupervised M Anomaly Detect Clustering: Ag Evaluation of uns	Unsupervised Machine Learning Anomaly Detection: Basic techniques for univariate data, kNN, LOF, iForest, Clustering: Agglomerative, K-Means, DBSCAN, Fuzzy clustering; Evaluation of unsupervised techniques					
V	Advanced topics6Artificial neural networks- Introduction, working, activation functions;6Handling unstructured data: Natural Language Processing Fundamentals;6Introduction to big data concepts and tools6						
VI	Communicating data insights and ethical considerationsEffective Reporting: Structuring and writing comprehensive data reports;Data Storytelling: Techniques to create compelling narratives with data;Visualization Best Practices: Designing clear and impactful charts and graphs; Presentation Skills: Delivering findings to technical and non- technical audiences; Privacy, bias, and fairness in data science; Bias and Fairness: Identifying and mitigating bias in data and algorithms: Case Studies						
Textbooks							
1	Grus, Joel. Data science from scratch: first principles with python. O'Reilly Media, 2019.						
2	VanderPlas, Jake "O'Reilly Media,	e. Python data s Inc.", 2016.	cience handbo	ok: Essential	tools for work	king with data.	
			References				
1	Robinson, Emily, 2020.	and Jacqueline N	lolis. Build a ca	reer in data sci	ence. Manning	Publications,	
2	O'Neil, Cathy, an "O'Reilly Media,	d Rachel Schutt. I Inc.", 2013.	Doing data scie	nce: Straight ta	lk from the from	ntline.	
			<b>Useful Links</b>				
1	NPTEL course L	ink					
2	https://www.anal	<u>yticsvidhya.com/</u>					
		С	O-PO Mappin	g			
		Pı	rogramme Out	comes (PO)			
	1	2	3	4	5	6	
CO1	1	1			2	2	
CO2	1	1	2	2	1	3	
CO3	1	2	3	3	1	3	
<b>CO4</b>	1	2	3	3	1	3	
The streng	gth of mapping is to	be written as 1:	Low, 2: Mediur	n, 3: High			
Each CO	of the course must	map to at least on	e PO.				

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
	AY 2024-25							
				Course Info	rmation			
Progra	amme		M.Tech. ( C	Computer scienc	e and engineerin	g )		
Class,	Seme	ster	First Year N	A.Tech., Sem I				
Cours	e Cod	e	7CO503					
Cours	e Nan	ie	Mathemat	tical foundation	ons of Comput	er Sci	ence	
Desire	d Req	uisites:	Discrete M	lathematics				
			1					
Te	achin	g Scheme		Exa	mination Schen	ne (Ma	arks)	
Lectur	re	3 Hrs/week	ISE	MSE	ESE		Tota	l
Tutori	ial	-	20	30	50		100	
Practi	cal	-		•	Nil			
Intera	ction	-			Credits: .	3		
Course Objectives								
1	1 To introduce the mathematical fundamentals for computer science and engineering.							
2	2 To study various sampling and classification problems.							
3								
	1 4		ourse Outcor	nes (CO) with	Bloom's Taxono	omy L	evel	
At the end of the course, the students will be able to,								
СО				omo Statoman			Bloom s Taxonomy	Taxonomy
				Joine Statemen	10/8		Level	Description
								*
	gras	the fundamer	ntal technique	s studied in stati	stics and graph th	neory	II	understanding
CO1	to so	lve problems i	in domains su	ich as data mini	ng, machine lear	ning,		
	netw	ork analysis.						
CO2	solv	e various pr	oblems on	probability, s	sampling, statis	stics,	111	applying
	grap	n theory.	ode of stati	ation information	a and the sele	that	IV/	analysing
CO3		yse me metn pling distribu	tions play in	those method	e, and the role s.	mat	11	anarysnig
	eval	uate correct a	ind meaning	ful statistical a	nalysis of simp	le to	V	evaluating
CO4	mod	erate comple	xity.		, I			
		<b>^</b>						
Modu	ıle			Module Con	itents			Hours
	F	robability						
	P	robability r	nass, densi	ty, and cun	nulative distri	butior	functions,	,
I	P	arametric far	nilies of dist	ributions, Exp	ected value, var	riance	, conditional	6
	e	xpectation, A	applications	of the univaria	te and multivat	riate C	Central Limit	t
	Theorem, Probabilistic inequalities, Markov chains							

П	Sampling Random sa Moments ar	Sampling Random samples, sampling distributions of estimators, Methods of Moments and Maximum Likelihood7						
ш	Statistical Statistical regression a problem of	Statistical inferenceStatistical inference, Introduction to multivariate statistical models:regression and classification problems, principal components analysis, Theproblem of overfitting model assessment.						
IV	Graph The Graph Theo circuits and repetition. problems	Graph TheoryGraph Theory: Isomorphism, Planar graphs, graph coloring, Hamiltoniancircuits and Euler cycles. Permutations and Combinations with and withoutrepetition. Specialized techniques to solve combinatorial enumerationproblems						
V	Computer science and engineering applicationsComputer science and engineering applications: Data mining, Networkprotocols, analysis of Web traffic, Computer security, Softwareengineering, Computer architecture, Operating systems, Distributedsystems, Bioinformatics, Machine learning.							
VI	Recent Trends Recent Trends in various distribution functions in mathematical field of computer science for varying fields like bioinformatics, soft computing, and computer vision.6							
			Toyt Do	olza				
1	Trivedi K., I Applications	Probability and S. Wiley.	l Statistics with	n Reliability, Q	ueuing, and C	computer Science		
2	Ronald Walp 978-0321629	ole, Probability a 111	and Statistics for	r Engineers and S	scientists, Pears	on, ISBN-13:		
1	John Vince	Foundation M	<b>Keferen</b>	ces Computer Scier	ce Springer			
2	Mitzenmach	er M. and Up	fal E., Probab	ility and Comp	uting: Randon	nized Algorithms		
3	Tucker Alan	, Applied Com	binatorics, Wi	le				
1			Useful Li	inks				
			CO-PO Man	ning				
			Programme	Outcomes (PO)				
СО	1	2	3	4	5	6		
CO1	1	1	1	1		1		
CO2	1	1	1	1		1		
CO3	1		1	1		1		
<b>CO4</b>	1							

The strength of mapping 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

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
			AY	2024-25				
			Course	e Informatio	0 <b>n</b>			
Progra	amme		M.Tech. (Compu	ter Science a	and Engineer	ring)		
Class,	Semester		First Year M. Te	ch., Sem I				
Cours	e Code		7CO551					
Cours	e Name		Advanced Data S	tructures La	.b			
Desire	ed Requisi	tes:	UG level course i	n Data Strue	ctures Lab			
,	Teaching	Scheme		Exami	nation Schei	ne (Mar	ks)	
Practi	cal	2 Hrs/ Week	LA1	LA2	L	ab ESE		Total
Intera	ction	-	30	30		40		100
					Credits:	1		
			Cours	e Objective	es			
1	The fund	amental design,	analysis, and impl	ementation	of basic data	structure	es.	
2	Basic con	ncepts in the spe	ecification and anal	lysis of prog	rams.			
3	Principle	s for good prog	ram design, especia	ally the uses	of data abst	raction.		
4	Significa	nce of algorithm	ns in the computer	field	• •	<b>T</b> 1		
Atthe	and of the	Course the stud	e Outcomes (CO)	with Bloom	i's l'axonon	ny Level		
At the		course, the stuc	ients will be able to	),		D	loom's	Dloom's
со		Cou	rse Outcome State	ement/s			xonomy Level	Taxonomy Description
CO1	Basic al	oility to analyzess and time effi	ze algorithms and ciency class.	d to detern	nine algorit	hm	III	Apply
CO2	Master a structure	a variety of ad s and their impe	vanced abstract d el mentation's.	ata type (A	ADT) and d	ata	IV	Analyze
CO3	3 Develop and analyze algorithms for red-black trees, B-trees and Splay V Evaluate					Evaluate		
CO4	Identify computat	suitable data tional geometry	structures and problems.	develop a	algorithms	for	V	Evaluate
	· •		List of Experimen	ts / Lab Act	tivities/Topi	cs		·

Implement the following using C/C++/Java

1. Write a program to perform the following operations on singly linked list. I) Creation ii) Insertion iii) Deletion iv) Traversal.

2. Write a program to perform the following operations on doubly linked list. I) Creation ii) Insertion iii) Deletion iv) Traversal in both ways

3. Write a program that implements stack (its operations) using i) Arrays ii) linked list

4. Write a programs that implements Queue (its operations) using i) Arrays ii) linked list

5. Write C program that implements the Quick sort method to sort a given list of integers in ascending order.

6. Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

7. Write C program that implement the SHELL sort method to sort a given list of integers in ascending order. (ex. WALCHAND COLLEGE OF ENGINEERING SANGLI 2023 Batch )8. Write a program to perform the following: i) Creating a Binary Tree of integers ii) Traversing the above binary tree in preorder, inorder and postorder.

9. Write a C program to perform the following: i) Creating a AVL Tree of integers ii) Traversing the above binary tree in preorder, inorder and postorder.

10. Write a C program that uses functions to perform the following: i) Creating a SplayTree of integers ii) Traversing the above binary tree in preorder, inorder and postorder.

11. Write a C program to perform the following: i) Creating a B-Tree of integers ii) Traversing the above binary tree in preorder, inorder and postorder.

12. Write a program that implements Kruskals algorithm using a disjoint set data structure. The program takes as input a file (data.txt), in which each line either represents a vertex or an edge. For the edge lines, the first integer on that line representing the starting vertex, the second the ending vertex, and the third the weigh of the edge. Use this file to construct, line by line, the graph upon which Kruskal''s algorithm will be run (do NOT hardcode this graph!).

13. Write a program to simulate various graph traversing algorithms.

14. Write a program to find the minimal spanning tree of a graph using the Prim"s algorithm. The program should be able to read in the weight matrix of a graph and produce the minimal spanning tree Generate weight matrices (using a random number generator) with a large number of nodes and estimate the time complexity of the algorithm.

15. Write a program to find the closest pair of points using a divide and conquer strategy. Use the random number generator to generate a large number of points in a unit square as input to the algorithm. Test the correctness of the algorithm by using a brute force method.

16. Use dynamic programming to find the optimal binary search tree for a given set of numbers together with their probabilities. Remember that the numbers may be generated in any order, so, a presorting step is also required.

	Textbooks						
1	Cormen Thomas H., Leiserson Charles E., Rivest Ronald L., Stein Clifford, Introduction to Algorithms PHI, Third Edition, 2009						
2	Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars, <i>Computational Geometry</i> - <i>Algorithms and Applications</i> , Springer, Third Edition, 2008						
3	Erik Demaine, Lecture Notes on MIT Courseware						
	References						
1	O'Rourke Joseph, Computational Geometry in C, Cambridge University Press						

2	Diestel Reinhard, Graph Theory, Springer-Verlag, 2000
3	Brass Peter, Advanced Data Structures, Cambridge University Press.
	Useful Links
1	NPTEL Videos of 'Data Structures and Algorithms' Course: Link
2	Data Structures with Visualization: Link
3	Lecture Videos from Erik Demaine from MIT: Link

CO-PO Mapping										
	Programme Outcomes (PO)									
	1	2	3	4	5	6				
CO1			2							
CO2	3					2				
CO3		2		2	1					
CO4			2			2				
The stre	The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High									
Each CO	O of the course	e must map to at lea	st one PO, and p	referably to only	one PO.					

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 Based on Conducted by Typical Schedule Marks									
	Lab activities,		During Week 1 to Week 8						
LA1	attendance,	Lab Course Faculty	Marks Submission at the end of	30					
	journal		Week 8						
	Lab activities,		During Week 9 to Week 16						
LA2	attendance,	Lab Course Faculty	Marks Submission at the end of	30					
	journal		Week 16						
	Lab activities,	Lab Course Faculty and	During Week 18 to Week 19						
Lab ESE	journal/	External Examiner as	Marks Submission at the end of	40					
	performance	applicable	Week 19						
Week 1 indicate	es starting week o	f a semester. Lab activities/	Lab performance shall include perfo	rming					
experiments, m	ini-project, preser	ntations, drawings, program	ming, and other suitable activities, a	s per the					
nature and requ	irement of the lab	course. The experimental l	ab shall have typically 8-10 experim	ents and					
related activitie	s if any.								

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
AY 2024-25									
			Course	e Information					
Progra	amme		M.Tech. (Compu	ter Science and Eng	gineering)	)			
Class,	Semester		First Year M. Tec	ch., Sem I					
Cours	e Code		7CO554						
Cours	e Name		Data Science Lab	)					
Desire	ed Requisi	tes:	Python						
	-		•						
	Teaching	Scheme		Examination	Scheme (	Marks)			
Practi	cal	2Hrs/Week	LA1	LA2	Lab	ESE	Т	otal	
Intera	ction		30	30	4(	)		100	
				Cre	dits: 1				
		1							
			Cours	se Objectives					
1	To emph	asise significan	ce of Data Science	in real life.					
2	To inculo	cate selection of	statistical and mac	chine learning meth	ods to sol	ve real life	problei	ms.	
3	To infuse	e skills required	to extract and com	municate useful ins	sights from	n data.			
		Cours	e Outcomes (CO)	with Bloom's Tax	onomy L	evel			
At the	end of the	course, the stud	lents will be able to	Э,		- D1 - 4			
со		Cou	rse Outcome State	ement/s		Bloom's Taxonom Level	6 1y   T   D	Bloom's Saxonomy escription	
CO1	practice using rec raw data.	data handling, a quired tools and	analysis techniques l libraries to derive	and ethical conside meaningful insign	erations nts from	III		Applying	
CO2	scrutiniz statistica problems	<b>e</b> datasets and t l methods and s.	their ethical consid algorithms to solv	erations using fund ve real-world data	amental science	IV	I	Analysing	
CO3	gauge ef solve re responsit	fectiveness of al-life problen pilities associate	statistical methods ns as well as e ed with data science	and algorithms to thical consideration practices.	o derive ons and	V	E	Evaluating	
CO4	formulate report.	e a data scienc	e problem stateme	ent and build a nat	rrative	VI		Creating	
		]	List of Experimen	ts / Lab Activities/	Topics				

# List of Lab Activities:

- 1. Use python libraries to load data and compute basic statistics.
- 2. Exploratory Data Analysis: Perform EDA on any open dataset available in Python/Kaggle.
- 3. Data visualization: Using various plots such as Scatter plot, bar graph, histogram, box plot, explore the relationship between attributes of a dataset using python or t-SNE.
- 4. Use and evaluate linear/multiple regression on any open dataset. Report RMSE and R-squared value.
- 5. Use and evaluate logistic regression on any suitable dataset. Report accuracy and F score.
- 6. Use and evaluate decision tree on any suitable dataset. Report accuracy and F score.
- 7. Use and evaluate Random Forest and XGBoost. Report accuracy and F score.
- 8. Use and evaluate anomaly detection algorithms for anomaly detection.
- 9. Use and evaluate Agglomerative clustering, K- means and DBSCAN.
- 10. Observe effect of dimensionality reduction by implementing a ML model with and without PCA.
- 11. Use and evaluate artificial neural networks for classification problem.
- 12. Create interactive dashboards using Power BI or Tableau.
- 13. Prepare and deliver a presentation of a data project by creating compelling narratives using data visualizations.
- 14. Formulate a data science problem statement and build a narrative report.
- 15. Analyse case studies to identify ethical dilemmas. Discuss potential solutions and best practices

Textbooks							
1	Grus, Joel. Data science from scratch: first principles with python. O'Reilly Media, 2019.						
C	VanderPlas, Jake. Python data science handbook: Essential tools for working with data. "O'Reilly						
Z	Media, Inc.", 2016.						
	References						
1	Robinson, Emily, and Jacqueline Nolis. Build a career in data science. Manning Publications, 2020.						
n	O'Neil, Cathy, and Rachel Schutt. Doing data science: Straight talk from the frontline. "O'Reilly						
Z	Media, Inc.", 2013.						
	Useful Links						
1	https://www.analyticsvidhya.com/						
2	https://www.w3schools.com/datascience/						

CO-PO Mapping										
	Programme Outcomes (PO)									
	1	2	3	4	5	6				
CO1	2	1	1	1	2	2				
CO2	2	1	2	2	1	3				
CO3	2	2	3	3	1	3				
CO4	2	2	2	2	1	2				
The stre	The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High									
Each CO	O of the course	e must map to at lea	st one PO, and p	referably to only	one PO.					

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	Assessment Based on Conducted by Typical Schedule Marks								
	Lab activities,		During Week 1 to Week 8						
LA1	attendance,	Lab Course Faculty	Marks Submission at the end of	30					
	journal		Week 8						
	Lab activities,		During Week 9 to Week 16						
LA2	attendance,	Lab Course Faculty	Marks Submission at the end of	30					
	journal		Week 16						
	Lab activities,	Lab Course Faculty and	During Week 18 to Week 19						
Lab ESE	journal/	External Examiner as	Marks Submission at the end of	40					
	performance	applicable	Week 19						
Week 1 indicate	es starting week o	f a semester. Lab activities/	Lab performance shall include performance	rming					
experiments, m	ini-project, preser	ntations, drawings, program	ming, and other suitable activities, as	s per the					
nature and requ	irement of the lab	course. The experimental l	lab shall have typically 8-10 experim	ents and					
related activitie	s if any.								

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
AY 2024-25								
Course Information								
Progra	amme		M.Tech. (Compu	ter Science and En	gineering	)		
Class.	Semester	,	First Year M. Te	ch., Sem I	5 - 6,	·		
Cours	e Code		7C0553					
Cours	e Name		Presentation and	Technical Report V	Vriting			
Desire	d Requisi	tes•	Tresentation and		, inting			
Desire	u Kequisi	ites.						
	Teaching	Scheme		Evamination	Schome (	Marks)		
Drooti		2 Hrs/ Week	TA1		Lob I	TCE		Total
Intono	ation		20	20				100
Intera	cuon	-	30		40	)		100
				Cre	eans: 1			
			Com					
1	D 1	<u>,1 1'1', ,</u>		se Objectives				
	Develop	the ability to we	ork independently	on a chosen topic.				
2	Foster cr	eative thinking	in the process of te	chnical report writ	ing.			
3	Ennance	skills in produc	ang nign-quality te	chnical reports.				
4	Improve	Comments in	a Outcomer (CO)	ar presentations.		arral		
At the	and of the		e Outcomes (CO)	with Bloom's Tax	lonomy L	ever		
At the end of the course, the students will be able to,								
						Dloom	20	Dloom <sup>2</sup> a
СО		Cour	rse Outcome State	ement/s		Bloom Taxono Leve	n's omy el	Bloom's Taxonomy Description
CO CO1	Explain	<b>Coun</b> the characteristic	rse Outcome State	ement/s		Bloom Taxono Leve	n's omy el	Bloom's Taxonomy Description Understanding
CO CO1 CO2	Explain Use varie	Count the characteristic ous materials to	cs of technical and create effective vis	ement/s business writing. sual presentations f	or	Bloom Taxono Leve	n's omy el	Bloom's Taxonomy Description Understanding Applying
CO CO1 CO2	Explain Use varie documer	Count the characteristic ous materials to outs, such as instr	rse Outcome State cs of technical and create effective vis uctions, description	ement/s business writing. sual presentations f ns, and research rep	or ports	Bloom Taxono Leve II III	n's omy el	Bloom's Taxonomy Description Understanding Applying
CO CO1 CO2 CO3	Explain Use varie documer Produce	Count the characteristic ous materials to the characteristic ous materials to the characteristic clear, concise, a	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum	ement/s business writing. sual presentations f ns, and research rep nents related to tec	or ports hnology	Bloom Taxono Leve II III	n's omy el	Bloom's Taxonomy Description Understanding Applying Applying
CO CO1 CO2 CO3	Explain Use varie documer Produce and work	Count the characteristic ous materials to outs, such as instr clear, concise, a cplace writing.	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum	ement/s business writing. sual presentations f ns, and research rep nents related to tec	or oorts hnology	Bloon Taxono Leve II III	n's omy d	Bloom's Taxonomy Description Understanding Applying Applying
CO CO1 CO2 CO3 CO4	Explain Use varie documer Produce and work Evaluate	the characteristic ous materials to ats, such as instr clear, concise, a cplace writing.	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and	for ports hnology pusiness	Bloom Taxono Leve II III III	n's omy d	Bloom's Taxonomy Description Understanding Applying Applying Evaluating
CO CO1 CO2 CO3 CO4	Explain Use varie documer Produce and work Evaluate documer	Count the characteristic ous materials to outs, such as instricter, concise, a cplace writing. the effectiven outs.	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and	for ports hnology pusiness	Bloom Taxono Leve II III III V	n's omy d	Bloom's Taxonomy Description Understanding Applying Applying Evaluating
CO CO1 CO2 CO3 CO4	Explain to Use varied documer Produce and work Evaluated documer	Count the characteristic ous materials to outs, such as instr clear, concise, a cplace writing. the effectiven outs.	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum ness and clarity of List of Experimen	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and the ts / Lab Activities	for ports hnology pusiness / <b>Topics</b>	Bloom Taxono Leve II III III V	n's omy d	Bloom's Taxonomy Description Understanding Applying Applying Evaluating
CO CO1 CO2 CO3 CO4	Explain Use varie documer Produce and work Evaluate documer	Count the characteristic ous materials to the such as instr clear, concise, a cplace writing. the effectiven the structure the s	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum ness and clarity of List of Experimen	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and the ts / Lab Activities	for ports hnology pusiness /Topics	Bloon Taxono Leve II III III V	n's omy el	Bloom's Taxonomy Description Understanding Applying Evaluating
CO CO1 CO2 CO3 CO4 List of This co supple writing This co	Explain to Use varie documer Produce and work Evaluate documer <b>f Lab Acti</b> ourse intro ment text, g reports a ourse is de	Counter the characteristic ous materials to ous materials to ous materials to clear, concise, a cplace writing. the effectiven outs.	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum tess and clarity of List of Experimen to the discipline of munication, descri ics included. ents enrolled in tech	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and to tts / Lab Activities technical commun ptions of mechanis hnical degree progr	for ports hnology pusiness / <b>Topics</b> ication. Pr ms, expla- rams for n	Bloon Taxono Leve II III III V reparation nations o naking th	n's omy l l n of v f proo	Bloom's Taxonomy Description Understanding Applying Evaluating isuals to cesses, and dustry ready.
CO CO1 CO2 CO3 CO4 List of This co supple writing This co	Explain to Use varie documer Produce and work Evaluate documer f Lab Action ourse intro- ment text, g reports a ourse is de	Count the characteristic ous materials to nts, such as instri- clear, concise, a cplace writing. the effectiven its.	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum tess and clarity of List of Experimen to the discipline of munication, descri ics included. ents enrolled in tech	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and the tts / Lab Activities technical commun ptions of mechanis hnical degree progree	for ports hnology pusiness / <b>Topics</b> ication. Pr ms, expla- rams for n	Bloon Taxono Leve II III III V reparation nations o naking th	n's omy l	Bloom's Taxonomy Description Understanding Applying Evaluating isuals to cesses, and dustry ready.
CO CO1 CO2 CO3 CO4 List of This co supple writing This co	Explain to Use varied documer Produce and work Evaluated documer f Lab Action pourse intro- ment text, g reports a pourse is de	Count the characteristic ous materials to outs, such as instri- clear, concise, a cplace writing. the effectiven its.	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum tess and clarity of List of Experimen to the discipline of munication, descri ics included. ents enrolled in tecl T	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and the technical commun ptions of mechanis hnical degree progr extbooks the topic.	For ports hnology pusiness / <b>Topics</b> ication. Pr ms, expla- rams for n	Bloon Taxono Leve II III III V reparation nations o naking th	n's omy l	Bloom's Taxonomy Description Understanding Applying Evaluating Evaluating isuals to cesses, and dustry ready.
CO CO1 CO2 CO3 CO4 List of This co supple writing This co 1	Explain to Use varied document Produce and work Evaluated document <b>Lab Action</b> ourse introor ment text, g reports a ourse is de	Count the characteristic ous materials to outs, such as instri- clear, concise, a cplace writing. The effectiven of the	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum mess and clarity of List of Experimen to the discipline of munication, descri ics included. ents enrolled in tech T l on the contents of R	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and to tts / Lab Activities technical commun ptions of mechanis hnical degree progr extbooks the topic. eferences	For ports hnology pusiness / <b>Topics</b> ication. Pr ms, expla- rams for n	Bloon Taxono Leve II III III V reparation nations o haking th	n's pmy l	Bloom's Taxonomy Description Understanding Applying Evaluating isuals to cesses, and dustry ready.
CO CO1 CO2 CO3 CO4 List of This co supple writing This co 1 1	Explain to Use varie documer Produce and worl Evaluate documer f Lab Action ourse intro ment text, g reports a ourse is de Suita and i	Count the characteristic ous materials to nts, such as instri- clear, concise, a cplace writing. the effectiven its. ivities: oduces students to workplace com- re the major top ssigned for stude ble books based nternational jour	rse Outcome State cs of technical and create effective vis- uctions, description and accurate docum less and clarity of List of Experimen to the discipline of munication, descri ics included. ents enrolled in tech T l on the contents of rnals and conference	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and to tts / Lab Activities technical commun ptions of mechanis hnical degree progr extbooks the topic. eferences the selected topic at ces.	for ports hnology pusiness /Topics ication. Pr ms, explate ams for m ams for m	Bloon Taxono Leve II III V reparation nations o naking th	n's omy l l n of v f proc em in	Bloom's Taxonomy Description Understanding Applying Evaluating Evaluating isuals to cesses, and dustry ready.
CO CO1 CO2 CO3 CO4 List of This co supple writing This co 1 1	Explain to Use varied documer Produce and work Evaluated documer f Lab Action ourse intro- ment text, g reports a ourse is de Suita and i	Count the characteristic ous materials to outs, such as instri- clear, concise, a cplace writing. The effectiven its.	rse Outcome State cs of technical and create effective vis uctions, description and accurate docum mess and clarity of List of Experimen to the discipline of munication, descri- ics included. ents enrolled in tech T l on the contents of R on the contents of rnals and conference	ement/s business writing. sual presentations f ns, and research rep nents related to tec of technical and to tts / Lab Activities technical commun ptions of mechanis hnical degree progr extbooks the topic. eferences the selected topic an ces.	For ports hnology pusiness / <b>Topics</b> ication. Pr ms, expla- rams for m rams for m	Bloom Taxono Leve II III III V reparation nations o haking th h papers	n's omy l l en of v f proo em in	Bloom's Taxonomy Description Understanding Applying Evaluating Evaluating isuals to cesses, and dustry ready.

1 As per the need of the topic of report and presentation

CO-PO Mapping										
	Programme Outcomes (PO)									
	1	2	3	4	5	6				
CO1		3	1							
CO2		3	1							
CO3		3	1							
CO4				2	1	1				
The stre	ength of mappi	ng is to be written a	us 1,2,3; where, 1	: Low, 2: Mediur	n, 3: High					
Each CO	O of the course	e must map to at lea	st one PO, and p	referably to only	one PO.					

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	Based on	Conducted by	Typical Schedule	Marks
	Lab activities,		During Week 1 to Week 8	
LA1	attendance,	Lab Course Faculty	Marks Submission at the end of	30
	journal		Week 8	
	Lab activities,		During Week 9 to Week 16	
LA2	attendance,	Lab Course Faculty	Marks Submission at the end of	30
	journal		Week 16	
	Lab activities,	Lab Course Faculty and	During Week 18 to Week 19	
Lab ESE	journal/	External Examiner as	Marks Submission at the end of	40
	performance	applicable	Week 19	
Week 1 indicate	es starting week o	f a semester. Lab activities/	Lab performance shall include perfo	rming

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.

Walshand Callege of Engineering Canali								
(Government Aided Autonomous Institute)								
AY 2024-25								
			Course Information	on				
Progra	amme		M.Tech. (Computer Science a	and Engineer	ing)			
Class,	Semester		First Year M. Tech., Sem I					
Cours	e Code		7CO511					
Cours	e Name		Image processing					
Desire	ed Requisi	tes:	Computer Graphics					
	Teaching	Scheme	Exami	nation Scher	ne (Marks)			
Lectur	re	3 Hrs/week	MSE	ISE	ESE	Total		
Tutori	ial	-	30	20	50	100		
			· · · · · · · · · · · · · · · · · · ·	Credits:	3			
		1						
			Course Objective	es				
1	To provi	le knowledge al	oout fundamentals of digital im	age processi	ng.			
2	To illustr	ate concepts of	image transforms, image enhan	ncement, ima	ge segmentatio	n, morphological		
	operation	s, color image p	processing, compression.					
3	To apply	the image proce	essing algorithms to real world	problems.				
		Cours	e Outcomes (CO) with Bloom	's Taxonom	y Level			
At the	end of the	course, the stud	lents will be able to,					
		C			Bloom's	Bloom's		
		Cours	Course Outcome Statement/s Taxonomy					
C01	explain	fundamental	concepts of digital image	processing	Level	Understanding		
CO1	explain mathema	fundamental (	concepts of digital image	processing,	II	Understanding		
CO1	explain mathema morpholo	fundamental tical transform	concepts of digital image ns, image enhancement, s n.	processing, egmentation,	II	Understanding		
CO1	explain mathema morpholo apply im	fundamental tical transform ogy, compressio age processing	concepts of digital image ns, image enhancement, s n. algorithms to solve real life p	processing, egmentation, problems and	II	Description           Understanding           Applying		
CO1 CO2	explain mathema morpholo apply im compare	fundamental tical transform ogy, compressio age processing the results.	concepts of digital image ns, image enhancement, s n. algorithms to solve real life p	processing, egmentation, problems and	II     III	Description           Understanding           Applying		
CO1 CO2 CO3	explain mathema morpholo apply im compare analyse t	fundamental tical transform ogy, compressio age processing the results. he effects of image	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform.	processing, egmentation, problems and	II III IV	Description       Understanding       Applying       Analysing		
CO1 CO2 CO3 CO4	explain mathema morpholo apply im compare analyse t design ar	fundamental tical transform ogy, compressio age processing the results. he effects of ima- ind compare diffe	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith	processing, egmentation, problems and nms.	II     III     IV     V	Description       Understanding       Applying       Analysing       Evaluating		
CO1 CO2 CO3 CO4	explain mathema morphole apply im compare analyse t design ar	fundamental tical transform ogy, compressio age processing the results. he effects of ima id compare diffe	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith	processing, egmentation, problems and nms.	II     III     IV     V	Understanding       Applying       Analysing       Evaluating		
CO1 CO2 CO3 CO4 Modu	explain mathema morphold apply im compare analyse t design ar	fundamental tical transform ogy, compressio age processing the results. he effects of ima id compare diffe	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents	processing, egmentation, problems and nms.	II II IV V	Description       Understanding       Applying       Analysing       Evaluating		
CO1 CO2 CO3 CO4 Modu	explain mathema morpholo apply im compare analyse t design ar lle Digit	fundamental tical transform ogy, compressio age processing the results. the effects of ima id compare diffe	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals	processing, egmentation, problems and nms.	II II IV V	Description       Understanding       Applying       Analysing       Evaluating		
CO1 CO2 CO3 CO4 Modu	explain mathema morphold apply im compare analyse t design ar lle Digit Intro	fundamental tical transform ogy, compressio age processing the results. he effects of ima ad compare diffe al Image Funda duction: Cond	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals cept, Fundamental Steps and	processing, egmentation, problems and nms. d Componen	Itevel       II       III       IV       V	Description       Understanding       Applying       Analysing       Evaluating		
CO1 CO2 CO3 CO4 Modu	explain mathema morpholo apply im compare analyse t design ar lle Digit Intro Proce	fundamental tical transform ogy, compressio age processing the results. the effects of ima ad compare diffe al Image Funda duction: Cond ssing System	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals cept, Fundamental Steps and	processing, egmentation, problems and nms. d Componen	II II IV V hts of Image	Description       Understanding       Applying       Analysing       Evaluating       Hours       06		
CO1 CO2 CO3 CO4 Modu	explain mathema morphold apply im compare analyse t design ar ile Digit Intro Proce Digit Samp	fundamental tical transform ogy, compressio age processing the results. the effects of ima ad compare diffe al Image Funda duction: Cond ssing System al Image Funda	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals cept, Fundamental Steps and lamentals: Image Acquisition antization Imaging Geometry	processing, egmentation, problems and nms. d Component	II II IV V nts of Image image model, vpes of digital	Description       Understanding       Applying       Analysing       Evaluating       Hours       06		
CO1 CO2 CO3 CO4 Modu	explain mathema morpholo apply im compare analyse t design ar lle Digit Intro Proce Digit Samp image	fundamental tical transform ogy, compression age processing the results. he effects of ima ad compare differ al Image Funda duction: Cond ssing System al Image Funda ling and Qu	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals cept, Fundamental Steps and lamentals: Image Acquisition antization, Imaging Geometry	processing, egmentation, problems and nms. d Componen n, A simple , Different ty	II II IV V nts of Image image model, vpes of digital	Description       Understanding       Applying       Analysing       Evaluating       Hours       06		
CO1 CO2 CO3 CO4 Modu	explain mathema morpholo apply im compare analyse t design ar ile Digit Intro Proce Digit Samp image	fundamental tical transform ogy, compressio age processing the results. the effects of ima- ad compare diffe al Image Funda duction: Con- ssing System al Image Funda ling and Qu es e Transforms	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals cept, Fundamental Steps and lamentals: Image Acquisitior antization, Imaging Geometry	processing, egmentation, problems and nms. d Componen n, A simple , Different ty	II II IV V nts of Image image model, /pes of digital	Description       Understanding       Applying       Analysing       Evaluating       Hours       06		
CO1 CO2 CO3 CO4 Modu	explain mathema morphold apply im compare analyse t design ar lle Digit Intro Proce Digit Samp image 2D s	fundamental tical transform ogy, compressio age processing the results. the effects of ima ad compare diffe al Image Funda duction: Cond ssing System al Image Funda ling and Quess e Transforms ystems and New	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals cept, Fundamental Steps and lamentals: Image Acquisitior antization, Imaging Geometry cessary Mathematical prelimir	processing, egmentation, problems and mms. d Component h, A simple , Different ty naries, 2D O	II II IV V nts of Image image model, /pes of digital	Description       Understanding       Applying       Analysing       Evaluating       Hours       06		
CO1 CO2 CO3 CO4 Modu I	explain mathema morpholo apply im compare analyse t design ar ile Digit Intro Proce Digit Samp image 2D s Unita	fundamental tical transform ogy, compression age processing the results. he effects of ima ad compare differ al Image Funda duction: Cond ssing System al Image Funda ling and Qu es e Transforms ystems and New ry Transforms,	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals cept, Fundamental Steps and lamentals: Image Acquisitior antization, Imaging Geometry cessary Mathematical prelimir 1-D DFT, KL-Transforms, Cos	processing, egmentation, problems and mms. d Component n, A simple , Different ty naries, 2D O ine, Hadamat	II II IV V nts of Image image model, /pes of digital rthogonal and rd Transforms,	Description       Understanding       Applying       Analysing       Evaluating       Hours       06       07		
CO1 CO2 CO3 CO4 Modu	explain mathema morphold apply im compare analyse t design ar design ar <b>ile</b> <b>Digit</b> <b>Samp</b> image <b>Digit</b> Samp image 2D s Unita Introo	fundamental tical transform ogy, compressio age processing the results. the effects of ima- id compare diffe al Image Funda duction: Con- ssing System al Image Funda ling and Qu es e Transforms ystems and Nea ry Transforms, luction to Wave	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals cept, Fundamental Steps and lamentals: Image Acquisition antization, Imaging Geometry cessary Mathematical prelimin 1-D DFT, KL-Transforms, Cos let transforms	processing, egmentation, problems and mms. d Component h, A simple , Different ty naries, 2D O ine, Hadama	II II IV V nts of Image image model, /pes of digital rthogonal and rd Transforms,	Description       Understanding       Applying       Analysing       Evaluating       Hours       06       07		
CO1 CO2 CO3 CO4 Modu I	explain mathema morpholo apply im compare analyse t design ar <b>ile</b> <b>Digit</b> <b>Intro</b> Proce <b>Digit</b> Samp image 2D s Unita Introo <b>Imag</b>	fundamental tical transform ogy, compressio age processing the results. he effects of ima id compare diffe al Image Funda duction: Cond ssing System al Image Funda ling and Que ss e Transforms ystems and Neary Transforms, luction to Wave e Enhancemen	concepts of digital image ns, image enhancement, so n. algorithms to solve real life p age transform. erent image processing algorith <b>Module Contents</b> amentals cept, Fundamental Steps and <b>lamentals:</b> Image Acquisitior antization, Imaging Geometry cessary Mathematical prelimir 1-D DFT, KL-Transforms, Cos let transforms t	processing, egmentation, problems and mms. d Component n, A simple , Different ty naries, 2D O ine, Hadamat	II II IV V nts of Image image model, /pes of digital rthogonal and rd Transforms,	Description       Understanding       Applying       Analysing       Evaluating       Hours       06       07		
CO1 CO2 CO3 CO4 Modu I II	explain mathema morpholo apply im compare analyse t design ar ile Digit Intro Proce Digit Samp image 2D s Unita Introo <b>Imag</b> Point	fundamental tical transform ogy, compression age processing the results. he effects of ima ad compare differ al Image Funda duction: Cond ssing System al Image Funda ling and Qu es e Transforms ystems and New ry Transforms, luction to Wave e Enhancemen Processing,	concepts of digital image ns, image enhancement, so algorithms to solve real life p age transform. erent image processing algorith Module Contents amentals cept, Fundamental Steps and lamentals: Image Acquisition antization, Imaging Geometry cessary Mathematical prelimin 1-D DFT, KL-Transforms, Cos let transforms t Basic Gray Level Tra	processing, egmentation, problems and ms. d Component h, A simple , Different ty naries, 2D O ine, Hadamations	II II IV V nts of Image image model, ypes of digital rthogonal and rd Transforms, , Histogram	Description       Understanding       Applying       Analysing       Evaluating       Hours       06       06		

IV	Image Segmenta Edge Detection – detector, Bounda Transform, Activ – region growing	, Canny edge earch, Hough Segmentation	07					
V	Image Compress Fundamentals, Co Fundamentals of Dictionary-based Image Compressi	on, n coding, d coding,	06					
VI	Morphological I Introduction, Dila transformation, B Filling, Extraction	-or-miss ction, Region g	07					
			Textbooks					
1	Gonzalez R. C., Woods R. E., "Digital Image Processing". PHI. Second Edition. 2002							
2	Jain A. K., "Fund	amentals of Digit	al Image Proce	ssing", PHI				
			References					
1	Sonka Milan, Va Learning, Third e	clav Hlavac, Boy dition, 2013	le, "Digital Ima	age Processing a	and Computer V	Vision", Cengage		
2	S. Jayaraman, S. edition, 2010	Esakkirajan, I. V	eerkumar, "Dig	Ital Image Proce	essing", Tata M	cGrawHill, Third		
			Useful Links					
1	https://www.math	works.com/produ	icts/image-proc	essing				
	, <u>1</u>		CO-PO Mappi	ng				
		]	Programme Oi	itcomes (PO)				
	1	2	3	4	5	6		
CO1	1							
CO2	1							
CO3	1	2	2					
CO4	1	3	2					
The streng	gth of mapping is to	be written as 1:	Low, 2: Mediur	n, 3: High				
Each CO of the course must map to at least one PO.								

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
AY 2024-25								
Course Information								
Progr	Programme M.Tech. (Computer Science and Engineering)							
Class,	Semest	er	First Year M. Tech., Sem I	U				
Cours	e Code		7CO516					
Cours	se Name		Professional Elective-I: Compu	ıtational	Complexity			
Desire	ed Requ	isites:	Theory of computation		1 2			
	Teachi	ng Scheme	Examinati	on Sche	me (Marks)			
Lectu	re	3 Hrs/week	MSE	SE	ESE	Total		
Tutor	ial	-	30 2	20	50	100		
				Credits:	3	1		
			1					
			Course Objectives					
1	To kn BPP.	ow the examples o	f problems in the basic complexi	ty classe	es: NL, P, NP, I	PSPACE, P/poly,		
2	To un proble	derstands success m. a class of comr	ive levels of generality: comple	exity of	an algorithm,	complexity of a		
3	To u proble	nderstand the use	fulness of the information on	computa	ational comple	exity of practical		
	<b>P</b>	Course	Outcomes (CO) with Bloom's T	axonon	ny Level			
At the	end of	he course, the stud	lents will be able to,		<i></i>			
со		Course	Outcome Statement/s		Bloom's Taxonomy Level	Bloom's Taxonomy Description		
CO1	under vs NP	tand the foundation	onal concepts of NP completenes	s and P	II	Understanding		
CO2	show	use of various tec	hniques to analyze and compare zed complexity classes.	e space	III	Applying		
CO3	illustr polvn	ate different tech omial class.	niques to solves problems rela	ated to	III	Applying		
CO4	explai	n communication and their role in v	, counting complexity and inte erifying computational tasks effi	eractive ciently	IV	Analyzing		
	<u>  [150]</u>				1	1		
Modu	ıle		Module Contents			Hours		
Ι	In Re	<b>roduction</b> view of NP Cor	npleteness, P vs NP, Cook-Le	evin Th	eorem, Time	6		
	Hi	erarchy Theorem,	Polynomial Hierarchy.					
п	Sp   Int   NI   Gi	ace complexity roduction to Spac $\lambda = coNL, PSPAC1-Solovay Theorem$	e Complexity, Savitch's Theorem CE Completeness, Space Hierard n.	m, NL-C chy The	Completeness, orem, Baker-	7		
III	Ra Ra No	ndomized and Nondomized Complement	onuniform computation exity Classes, BPP is in po ttion, Circuit Complexity.	olynomi	al hierarchy,	7		

					1	
	Circuits and P	olynomial hierarc	hy			
IV	Parity not in AC	^0, Karp-Lipton Tl	heorem, Adlem	an's Theorem, P	olynomial	7
	Identity Testing	, Isolation Lemma,	, Perfect Match	ing is in RNC^2		
	Complexity of	6				
V	#P and #P Co	0				
	Theorem and T	oda's Theorem.				
	Communicatio	n Complexity and	l Interactive p	roofs		
VI	Communication	Complexity, Mor	notone depth lo	ower bound for	matching,	6
	Interactive Proc	fs.				
			Textbooks			
1	Computational	Complexity, by Ch	ristos Papadim	itriou		
2	Computational	Complexity: A Mo	dern Approach	, by Sanjeev Arc	ora and Boa	z Barak.
			References			
1	Introduction to	the Theory of Com	putation by Mi	chael Sipser.		
2	Computational	Complexity: A Mo	dern Approach	Sanjeev Arora a	nd Boaz Ba	arak.
			Useful Links			
1	https://onlineco	urses.nptel.ac.in/nc	oc21_cs90/prev	iew		
		C	O-PO Mappin	g		
		Pr	ogramme Out	comes (PO)		
	1	2	3	4	5	6
C01						
CO2	1			2		
CO3	1			2		2
<b>CO4</b>	1				2	2
The stren	oth of manning is	to be written as $1^{\circ}$	Low 2: Medin	m. 3: High		
Fach CO	of the course mus	t man to at least on	2011, 21 1110010 ne PO	, 2. 111511		

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
AY 2024-25									
			<b>Course Information</b>						
Progr	Programme M.Tech. (Computer Science and Engineering)								
Class.	Semester		First Year M. Tech., Sem I						
Cours	e Code		7CO513						
Cours	Course Name Human Computer Interaction								
Desire	Desired Requisites Software Engineering								
Desire	Software Engineering								
Teaching Scheme Evamination Scheme (Marks)									
Lectu	re	3 Hrs/week	MSF ISF	ESE	Total				
Tutor	iol	-	30 20	50	100				
Tutor	141		Credits.	30	100				
			Creuits.	•					
			Course Objectives						
1	Introduct	tion to concept r	elated to Human Computer Interaction						
1	Understa	nd the theoretic:	al dimensions of human factors involved in	the accentance	of computer				
2	interface	s		the acceptance	or computer				
	Identify	the impact of us	able interfaces in the acceptance and perform	mance utilization	on of				
3	informat	ion systems.							
	Identify	the importance of	of working in teams and the role of each me	mber within an	interface				
4	developm	nent phase.	C						
		Course	Outcomes (CO) with Bloom's Taxonom	/ Level					
At the	end of the	course, the stud	ents will be able to,						
				Bloom's	Bloom's				
CO		Cours	se Outcome Statement/s	Taxonomy	Taxonomy				
				Level	Description				
CO1	understa	nd the fundame	ntals of Human-Computer Interaction an	II <sup>b</sup>	Understandin				
		on design.			g				
CO2	apply hu	man Capabilitie	s and Core Cognitive aspects of interactio	n III	Applying				
	aesign.	montitativa aral	usis avaluation and radacion through UC	T					
		quantitative anal	systs, evaluation, and redesign through HC	I IV	Analysing				
CO4	evaluate	sample interface	es using different models of HCI	V	Evaluating				
	evuluate	sumple interrue			Drutating				
Modu	ıle		Module Contents		Hours				
	Intro	duction to Hun	nan-Computer Interaction						
	What	is HCI – de	sign, models, evaluation. Need to und	erstand people.					
	comp	uters and metho	ds. Basic human abilities - vision, hearing,	touch, memory.					
	The	difference betw	een good and poor interaction design, v	hat interaction					
I	desig	n is and how it r	elates to human-computer interaction and	other fields.	7				
	Need	for Design - E	Examples from Design of everyday thing	s, case studies,					
	Evolu	ation of the web	and digital interfaces.						
	Exerc	cise – Identify p	roblems around us requiring design soluti	on or problems					
	solve	d using design.							

	The Design Proc	ess									
	Interaction design	n basics, HCI in th	he software pro	cess, Design rule	es, Evaluation						
п	techniques, Univ	ersal design, Use	er support, Îndi	vidual differenc	es, designing	6					
11	interfaces for all,	0									
	and poor design, Ergonomics.										
	Exercise- Creating persona for different application in everyday use.										
	The Interaction			~							
	What, why and whether	hen to evaluate, D	esign guideline	s, Golden rules a	nd heuristics,						
	Goals of Evalua										
III	through: Expert a	nalysis, User part	licipation.	forant annligation	a in avomuday	6					
	Exercise-User Fe	recise description	n of the user of	f the product in	focus of the						
	design and what	the user wishes	s to accomplis	h Design a sm	all prototype						
	(Web/Mobile Apr	p) of it and evaluation	ate it using diffe	erent evaluation	techniques						
	UI Evaluation T	echniques			······						
IV	Models- Cognitiv	e models, Goal ar	nd Task hierarcl	hy models, Lingu	uistic models,	6					
	Physical and Dev	ice models, Desig	gn principles.								
	Real Time Appli	cations									
	Conduct evaluation	ion of different	sample interfa	ices using diffe	rent models.	7					
	Introduction to	Prototyping tool	ls, Understand	ing how UI I	nteraction &	,					
	Prototype Design	works, $UX - Inc$	dustry overview	v. Prototyping /	wire framing						
	Advances of Hu	man Computer I	nteraction								
VI	Introduction Relation between AR VR and HCI Different tool kits in AR and 7										
	VR,implementati	on of HCI using A	AR and VR, AI	in HCI		,					
	· · · ·	0	Textbooks								
1	"Human Compute	er Interaction" by	Alan Dix, Jane	et Finlay, ISBN:9	78813171703	5, Pearson					
1	Education (2004)										
2	"Designing the U	ser Interface - St	rategies for Eff	ective Human C	omputer Intera	ction", by Ben					
	Shneiderman ISBN: 9788131732557, Pearson Education (2010).										
	Shneiderman ISB	11. 77001317323	Defenences	References							
	Usebility Engines	ring: Soonario D	References	ant of Human C	omputor Intor	ation by					
1	Usability Enginee	ering: Scenario-Barroll L (2002)	References ased Developm	ent of Human-C	omputer Intera	ction, by					
1	Usability Enginee Rosson, M. and C The Essentials of	ering: Scenario-B. Carroll, J. (2002) Interaction Desig	References ased Developm	ent of Human-C	omputer Intera	ction, by					
1 2	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee	ering: Scenario-B Carroll, J. (2002) Interaction Desig gring, by Nielsen.	<b>References</b> ased Developm gn, by Cooper, e J. Morgan Kau	ent of Human-C et al., Wiley Publ fmann, San Frar	omputer Intera lishing (2007) acisco, 1993. Is	SBN 0-12-					
1 2 3	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9	ering: Scenario-B Carroll, J. (2002) Interaction Desig pring, by Nielsen,	References ased Developm gn, by Cooper, e J. Morgan Kau	ent of Human-C et al., Wiley Pub fmann, San Frar	omputer Intera lishing (2007) acisco, 1993. Is	SBN 0-12-					
1 2 3	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Inte	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun	References ased Developm gn, by Cooper, e J. Morgan Kau dations for Inte	ent of Human-C et al., Wiley Pub fmann, San Frar raction Design, I	omputer Intera lishing (2007) acisco, 1993. Is py Heim, S., A	SBN 0-12-					
1 2 3 4	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Inte Wesley. (2007)	ering: Scenario-B Carroll, J. (2002) Interaction Desig pring, by Nielsen, erface: HCI Foun	<b>References</b> ased Developm gn, by Cooper, e J. Morgan Kau dations for Inte	ent of Human-C et al., Wiley Pub Ifmann, San Frar raction Design, I	omputer Intera lishing (2007) acisco, 1993. Is py Heim, S., A	SBN 0-12- ddison-					
1 2 3 4	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Inte Wesley. (2007)	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun	References ased Developm gn, by Cooper, e J. Morgan Kau dations for Inte Useful Links	ent of Human-C et al., Wiley Pub fmann, San Frar raction Design, I	omputer Intera lishing (2007) hcisco, 1993. IS by Heim, S., A	SBN 0-12- ddison-					
1 2 3 4 1	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Into Wesley. (2007)	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun cmu.edu/research	References ased Developm gn, by Cooper, e J. Morgan Kau dations for Inte Useful Links areas/artificial	ent of Human-C et al., Wiley Publ fmann, San Frar raction Design, I -intelligence-ai	omputer Intera lishing (2007) acisco, 1993. Is by Heim, S., A	SBN 0-12- ddison-					
$\begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ \hline 1 \\ 2 \\ 2 \\ \end{array}$	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Inte Wesley. (2007)	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun cmu.edu/research edin.com/advice/1	References ased Developm gn, by Cooper, e J. Morgan Kau dations for Inte Useful Links a-areas/artificial 1/how-does-ai-i	ent of Human-C et al., Wiley Publ fmann, San Frar raction Design, I -intelligence-ai mpact-human-co	omputer Intera lishing (2007) acisco, 1993. IS by Heim, S., A	SBN 0-12- ddison-					
1 2 3 4 1 2 3	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Inte Wesley. (2007) https://www.hcii. https://www.linke	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun cmu.edu/research edin.com/advice/1 action-design.org	References ased Developm gn, by Cooper, e J. Morgan Kau dations for Inte Useful Links i-areas/artificial l/how-does-ai-i g/literature/topic	ent of Human-C et al., Wiley Publ fmann, San Frar raction Design, I -intelligence-ai mpact-human-co cs/human-compu	omputer Intera lishing (2007) acisco, 1993. IS by Heim, S., A omputer-interaction	SBN 0-12- ddison-					
1 2 3 4 1 2 3	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Inte Wesley. (2007) https://www.hcii. https://www.linke	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun cmu.edu/research edin.com/advice/1 action-design.org	References ased Developm gn, by Cooper, e J. Morgan Kau dations for Inte Useful Links a-areas/artificial l/how-does-ai-i g/literature/topic O-PO Mappin	ent of Human-C et al., Wiley Publ fmann, San Frar raction Design, I -intelligence-ai mpact-human-co cs/human-compu g	omputer Intera lishing (2007) acisco, 1993. IS by Heim, S., A omputer-interaction	ction, by SBN 0-12- ddison- ction					
1 2 3 4 1 2 3	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Into Wesley. (2007) https://www.hcii. https://www.linke	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun cmu.edu/research edin.com/advice/I action-design.org	References ased Developm gn, by Cooper, e J. Morgan Kau dations for Inte Useful Links I-areas/artificial l/how-does-ai-i g/literature/topic O-PO Mappin rogramme Out	ent of Human-C et al., Wiley Publ fmann, San Frar raction Design, I -intelligence-ai mpact-human-co cs/human-compu g comes (PO)	omputer Intera lishing (2007) hcisco, 1993. IS by Heim, S., A omputer-interaction	SBN 0-12- ddison- ction					
1 2 3 4 1 2 3	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Inte Wesley. (2007) https://www.hcii. https://www.linke https://www.inter	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun cmu.edu/research edin.com/advice/1 action-design.org C Pr 2 1	References         ased Developm         gn, by Cooper, e         J. Morgan Kau         dations for Inte         Useful Links         1-areas/artificial         1/how-does-ai-i         z/literature/topic         O-PO Mappin         rogramme Out         3         2	ent of Human-C et al., Wiley Publ fmann, San Frar raction Design, I -intelligence-ai mpact-human-compu g comes (PO) 4	omputer Intera lishing (2007) acisco, 1993. IS by Heim, S., A omputer-interaction ter-interaction	SBN 0-12- ddison- ction					
1 2 3 4 1 2 3 3 <b>CO1</b> <b>CO1</b>	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Inte Wesley. (2007) https://www.hcii. https://www.linke https://www.linke	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun cmu.edu/research edin.com/advice/1 action-design.org 2 1 1	References         ased Developm         gn, by Cooper, e         J. Morgan Kau         dations for Inte         Useful Links         a-areas/artificial         1/how-does-ai-i         g/literature/topic         O-PO Mappin         rogramme Out         3         2         2         2	ent of Human-C et al., Wiley Publ fmann, San Frar raction Design, I -intelligence-ai mpact-human-co cs/human-compu g comes (PO) 4	omputer Intera lishing (2007) acisco, 1993. IS by Heim, S., A pomputer-intera ter-interaction	SBN 0-12- ddison- ction					
1 2 3 4 1 2 3	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Into Wesley. (2007) https://www.hcii. https://www.linko https://www.inter	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun cmu.edu/research edin.com/advice/1 action-design.org 2 1 1 1 1	References         ased Developm         gn, by Cooper, e         J. Morgan Kau         dations for Inte         Useful Links         i-areas/artificial         1/how-does-ai-i         z/literature/topic         O-PO Mappin         rogramme Out         3         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2	ent of Human-C et al., Wiley Publ fmann, San Frar raction Design, I -intelligence-ai mpact-human-compu g comes (PO) 4	omputer Intera lishing (2007) acisco, 1993. IS by Heim, S., A omputer-interaction 5	SBN 0-12- ddison- ction					
1 2 3 4 1 2 3 3 <b>CO1</b> <b>CO2</b> <b>CO3</b> <b>CO4</b>	Usability Enginee Rosson, M. and C The Essentials of Usability Enginee 518406-9 The Resonant Inte Wesley. (2007) https://www.hcii. https://www.linke https://www.inter	ering: Scenario-B Carroll, J. (2002) Interaction Desig ering, by Nielsen, erface: HCI Foun cmu.edu/research edin.com/advice/1 action-design.org C Pn 2 1 1 1 1 1	References         ased Developm         gn, by Cooper, e         J. Morgan Kau         dations for Inte         Useful Links         a-areas/artificial         1/how-does-ai-i         z/literature/topic         O-PO Mappin         rogramme Out         3         2          2	ent of Human-C et al., Wiley Publ fmann, San Frar raction Design, I -intelligence-ai mpact-human-compu g comes (PO) 4	omputer Intera lishing (2007) acisco, 1993. IS by Heim, S., A omputer-interaction 5	Ction, by SBN 0-12- ddison- ction 6 6					

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

## Assessment

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
	AY 2024-25								
Course Information									
Program									
Class, Ser	nester	First Year M.	Tech., Sem	I					
Course Co	ode	7CO517							
Course Na	ame	Artificial Inte	lligence						
Desired R	equisites:	Data structure	es, Algorithm	ns, Probability and Sta	atistics				
Т									
Locturo	3 Hrs/week	MSE		FSF	5) Total				
Tutorial	J III S/ WCCK	30	20	<b>ESE</b> 50	100				
1 0101 101	-	50	20	Credits: 3	100				
				cituits. 5					
		Course (	Objectives						
1	To acquaint students wi	th the meaning,	purpose, sco	ope, applications, and	effects of AI.				
2	To solve problems by a	pplying a suitab	le search me	thod, knowledge repr	resentation.				
3	To understand and repre	esent knowledge	e in AI syste	ms.					
4	To analyse real life prob	plems and provi	de solutions	by applying AI techn	iques.				
	Course Out	comes (CO) wi	th Bloom's	Faxonomy Level					
At the end	of the course, the studen	ts will be able to	0,						
со	Course Outco	ome Statement	/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description				
CO1	explain fundamental con	ncepts and chall	enges in AI	II	Understanding				
CO2	use the basic principles. AI to recognize, model	, models and alg and solve probl	gorithms of ems.	III	Applying				
CO3	examine performance A	AI techniques us	ed to solve	IV	Analyzing				
CO4	recommend AI techniq problems.	ues used to sol	ve real life	V	Evaluating				
Module		Module Cor	ntents		Hours				
Ι	Artificial Intelligence and Its Issues: Definitions - Importance of AI, Evolution of AI - Applications of AI, AI agent and environments, classification of AI systems with respect to environment, knowledge inferring systems and planning, uncertainty, learning systems, state-of-the-art of AI systems, responsible AI				5				

П	<b>Problem Solving by search</b> <b>Solving problems by searching</b> : Problem solving agents, Formulating problems, Solution search; <b>Search strategies:</b> BFS, DFS, Uniform cost, Depth limited; <b>Informed search methods:</b> Best first, A*, AO*, Hill climbing, Simulated annealing	6				
III	Knowledge Representation & Reasoning-I Knowledge based agents: Introduction Propositional logic: Syntax, Semantics, Inference, Rules First order predicate logic: Syntax and semantics, Extensions and notational variations, Simple reflex agent; Knowledge base creation: Example; Logical reasoning systems: Introduction, Indexing, Retrieval, Unification, Logic programming systems - Prolog	8				
IV	Knowledge Representation & Reasoning-II Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model. MDP formulation, utility theory.	8				
V	Game playing and Introduction to Planning Game playing: Introduction, Minimax search procedure, Alpha beta pruning; Planning: Introduction, Components of planning, Goal stack planning, Partial order planning, Full order planning	б				
VI	Learning Systems & Expert Systems: Forms of Learning Types - Supervised, Unsupervised, Reinforcement Learning, Decision Trees. Expert Systems (ES): Stages in the development, probability based ES, ES tools, difficulties in developing ES, Applications of ES, State-of-the-art case study.	6				
	Textbooks					
1	Elaine Rich and Kerin Knight, Artificial Intelligence, 3rd Edition, McGra 9780070087705	aw Hill. ISBN13:				
2	Eugene, Charniak, Drew Mcdermott, Introduction to artificial intelligenc ISBN 0-07-052263-4.	e, AddisonWesley.				
3	Deepak Khemani,"A First Course in Artificial Intelligence", McGraw Hill 2013.	Education (India),				
4	Stuart Russell, Peter Norvig, "Artificial Intelligence A Modern Approa 3rd Edition, 2009	ch", Prentice Hall,				
	References					
1	Khemani D., "Artificial Intelligence: Knowledge Representation and Rea Madras, Lecture Notes.	asoning", IIT				
2	2 Herbert A. Simon, The Sciences of the Artificial, MIT Press, 3rd Edition, 1998. ISBN: 9780262190510. George F Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Edu., 4th Edition. ISBN-13: 978-0-321-54589-3					
	Useful Links					

1	Artificial Intelligence: Knowledge Representation and Reasoning Course on NPTEL: Link NPTEL							
2	Artificial Ir	Artificial Intelligence Search Methods for Problem Solving Course on NPTEL: Link						
CO-PO Mapping								
	Programme Outcomes (PO)							
	1	2	3	4	5	6		
CO1	1	1	1	1	1	1		
CO2			1	2	1	2		
CO3			2	3		3		
CO4			3	2		2		
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High								
Each CO of the course must map to at least one PO.								

		Course I	nformation	1	
Programn					
Class, Sen	<u> </u>				
Course Co	ode	7CO515			
Course Na	ame	Professional El	lective 2 - A	dvanced Network Tec	hnology
Desired R	equisites:	Computer Netw	work		
Tea	ching Scheme		Examina	ation Scheme (Marks	)
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	20	100
Practical				Credits: 3	
		Course	Objectives		
1	To explain key conce operations.	epts of wireless no	etworks, sta	ndards, technologies a	nd their basic
2	To appraise architect	ures, functions ar	nd performa	nce of wireless sensor	network systems.
3	To examine SDN/NF	V motivation and	d its benefits	s in data center.	
4					
	Course Ou	itcomes (CO) wi	ith Bloom's	Taxonomy Level	
At the end	of the course, the stude	ents will be able t	to,		
СО	Course Out	come Statement	:/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
C01	explain compare characteristics of wireless				<b>TTTTTTTTTTTTT</b>
	explain, compare characteristics of whereas networks and describe wireless sensor network				Understanding
	networks, and descri	be wireless sense	or network	II	Understanding
	networks, and descri and SDN/NFV techn	be wireless sense ologies.	or network	Π	Understanding
CO2	networks, and descri and SDN/NFV techn apply acquired know	be wireless sense ologies. wledge to reco	or network	II	Applying
CO2	networks, and descri and SDN/NFV techn apply acquired kno performance of	be wireless sense ologies. wledge to reco wireless	or network	ш	Applying
CO2	networks, and descri and SDN/NFV techn apply acquired kno performance of and SDN/NFV netw	be wireless sense ologies. wledge to reco wireless vorks.	ognize the sensor	II	Applying
CO2 CO3	networks, and descri and SDN/NFV techn apply acquired kno performance of and SDN/NFV netw Apply the knowledg designing network	be wireless sense ologies. wledge to reco wireless vorks. ge of SDN and	ognize the sensor	II III III	Applying Applying
CO2 CO3	networks, and descri and SDN/NFV techn apply acquired kno performance of and SDN/NFV netw Apply the knowledg designing network	be wireless sense ologies. weldge to reco wireless vorks. ge of SDN and	or network ognize the sensor NFV for	II III III	Applying Applying Applying
CO2 CO3 CO4	networks, and descri and SDN/NFV techn apply acquired kno performance of and SDN/NFV netw Apply the knowledg designing network analyze wireless sens and SDN/NFV techn	be wireless sense ologies. wiedge to reco wireless vorks . ge of SDN and or network with higues in Data ce	or network ognize the sensor NFV for case study enter.	II III III IV	Applying Applying Applying Analyzing
CO2 CO3 CO4	networks, and descri and SDN/NFV techn apply acquired kno performance of and SDN/NFV netw Apply the knowledg designing network analyze wireless sens and SDN/NFV techr	be wireless sense ologies. wireless works . ge of SDN and or network with hiques in Data ce	or network ognize the sensor NFV for case study enter.	II III III IV	Applying Applying Applying Analyzing
CO2 CO3 CO4 Module	networks, and descri and SDN/NFV techn apply acquired kno performance of and SDN/NFV netw Apply the knowledg designing network analyze wireless sens and SDN/NFV techr	be wireless sense ologies. weldge to reco wireless vorks. ge of SDN and or network with hiques in Data ce Module Co	or network ognize the sensor NFV for case study enter.	II III III IV	Understanding         Applying         Applying         Analyzing         Hours
CO2 CO3 CO4 Module	networks, and descri and SDN/NFV techn apply acquired kno performance of and SDN/NFV netw Apply the knowledg designing network analyze wireless sens and SDN/NFV techr Introduction to Wir	be wireless sense ologies. wireless works . ge of SDN and or network with hiques in Data ce Module Co reless Networks	<ul> <li>whereas</li> <li>prize the sensor</li> <li>NFV for</li> <li>case study</li> <li>case study</li> <li>enter.</li> </ul>	II III III IV	Understanding         Applying         Applying         Analyzing
CO2 CO3 CO4 Module	networks, and descri and SDN/NFV techn apply acquired knop performance of and SDN/NFV netw Apply the knowledg designing network analyze wireless sens and SDN/NFV techr Introduction to Wir Network Architectur Protocols, Technolog	be wireless sense ologies. owledge to reco wireless yorks. ge of SDN and or network with hiques in Data ce <b>Module Co</b> reless Networks e, Network Comp ties and Applicati	<ul> <li>whereas</li> <li>pression network</li> <li>opnize the sensor</li> <li>NFV for</li> <li>case study enter.</li> <li>ontents</li> <li>ponents, De ions of BAN</li> </ul>	II III III IV sign Issues, Network J, PAN, LAN, MAN.	Understanding         Applying         Applying         Analyzing         Hours         7
CO2 CO3 CO4 Module	networks, and descri and SDN/NFV techn apply acquired knop performance of and SDN/NFV netw Apply the knowledg designing network analyze wireless sens and SDN/NFV techr Introduction to Wir Network Architectury Protocols, Technolog Wireless Wide Area	be wireless sense ologies. wireless works . ge of SDN and or network with hiques in Data ce Module Co reless Networks e, Network Comp gies and Applicati Networks: Introd	or network ognize the sensor NFV for case study enter. ontents ponents, De ions of BAN duction to C	II III III IV sign Issues, Network N, PAN, LAN, MAN. Cellular and Satellite	Understanding         Applying         Applying         Analyzing         Hours         7
CO2 CO3 CO4 Module	explain       ,compare e         networks, and descri       and SDN/NFV techn         apply       acquired       kno         performance       of       and SDN/NFV netw         Apply       the knowledge       designing network         analyze       wireless sens       and SDN/NFV techn         Introduction to Wir       Network       Architecture         Protocols, Technolog       Wireless       Wireless         Wireless       Wide       Area         Networks, Interwork       Network       Response	be wireless sense ologies. wireless works . ge of SDN and or network with hiques in Data ce Module Co reless Networks e, Network Comp gies and Application Networks: Introco ing of WLAN and	<ul> <li>whereas</li> <li>pression network</li> <li>opnize the sensor</li> <li>NFV for</li> <li>case study</li> <li>case study</li> <li>enter.</li> <li>mtents</li> <li>ponents, De</li> <li>ions of BAN</li> <li>duction to C</li> <li>d WWAN, V</li> </ul>	II III III IV sign Issues, Network N, PAN, LAN, MAN. Cellular and Satellite WWAN Applications	Understanding         Applying         Applying         Analyzing         Hours         7
CO2 CO3 CO4 Module	explain       ,compare to compare to	haracteristics of be wireless sense ologies. wireless orks . ge of SDN and or network with hiques in Data ce Module Co reless Networks e, Network Comp ties and Applicati Networks: Introc ing of WLAN and bile Ad hoc, W	or network ognize the sensor NFV for case study enter. mtents ponents, De ions of BAN duction to C d WWAN, V 'ireless Sen	II III III IV sign Issues, Network I, PAN, LAN, MAN. Cellular and Satellite WWAN Applications sor, Wireless Mesh	Understanding         Applying         Applying         Analyzing         Hours         7
CO2 CO3 CO4 Module	<ul> <li>explain , compare e e networks, and descri and SDN/NFV techn apply acquired knoperformance of and SDN/NFV netw</li> <li>Apply the knowledg designing network</li> <li>analyze wireless sens and SDN/NFV techr</li> <li>Introduction to Wir Network Architecture Protocols, Technolog Wireless Wide Area Networks, Interwork</li> <li>Introduction to Mo and Vehicular Network</li> </ul>	be wireless sense ologies. wireless works ge of SDN and or network with hiques in Data ce Module Co reless Networks e, Network Comp fies and Applicati Networks: Introd ing of WLAN and bile Ad hoc, W	or network ognize the sensor NFV for case study enter. ontents ponents, De ions of BAN duction to C d WWAN, V ireless Sen on to Netwo	II III III IV sign Issues, Network N, PAN, LAN, MAN. Cellular and Satellite WWAN Applications sor, Wireless Mesh ork, It's Motivations,	Understanding         Applying         Applying         Analyzing         Hours         7
CO2 CO3 CO4 Module	<ul> <li>explain , compare e e networks, and descri and SDN/NFV techn apply acquired knoperformance of and SDN/NFV netw Apply the knowledg designing network analyze wireless sens and SDN/NFV techn</li> <li>Introduction to Wir Network Architecture Protocols, Technolog Wireless Wide Area Networks, Interwork</li> <li>Introduction to Mo and Vehicular Network</li> </ul>	haracteristics of be wireless sense ologies. wireless works . ge of SDN and or network with hiques in Data ce Module Co eless Networks e, Network Comp ties and Applicati Networks: Introduction ing of WLAN and bile Ad hoc, W yorks: Introduction	<ul> <li>whereas</li> <li>or network</li> <li>ognize the sensor</li> <li>NFV for</li> <li>case study</li> <li>enter.</li> <li>ontents</li> <li>ponents, De</li> <li>ions of BAN</li> <li>duction to C</li> <li>d WWAN, V</li> <li>/ireless Sen</li> <li>on to Network</li> <li>History a</li> </ul>	II III III IV sign Issues, Network N, PAN, LAN, MAN. Cellular and Satellite WWAN Applications sor, Wireless Mesh ork, It's Motivations, and Design factors,	Understanding         Applying         Applying         Analyzing         1         7         7         7
CO2 CO3 CO4 Module	<ul> <li>Introduction to Wir Networks, Interwork</li> <li>Introduction to Wir Network Architectur</li> <li>Protocols, Technolog</li> <li>Wireless Wide Area</li> <li>Networks, Interwork</li> <li>Introduction to Mo</li> <li>and Vehicular Network</li> </ul>	haracteristics of be wireless sense ologies. wireless owledge to reco- wireless orks. ge of SDN and or network with hiques in Data ce <b>Module Co-</b> reless Networks e, Network Comp ties and Application Networks: Introduction ing of WLAN and bile Ad hoc, W vorks: Introduction mance metrics, e: Traditional lay	or network ognize the sensor NFV for case study enter. mtents ponents, De ions of BAN duction to C d WWAN, V ireless Sen on to Netwo History a yered stack, Vabicular N	II III III IV sign Issues, Network I, PAN, LAN, MAN. Cellular and Satellite WWAN Applications sor, Wireless Mesh ork, It's Motivations, and Design factors, Cross-layer designs, Networks	Understanding         Applying         Applying         Analyzing         1         7         7         7

	Research Issues in Wireless Networks:	
	Sensor Motes, and Hardware parameters configuration, Channel	
	Allocation, Error Control and Coding, Congestion Control, Routing,	
	Addressing, Network Access Control, Mobility Control, Flow Control,	
III	Security and Privacy, OoS Management, Power Management, Cross-	
	Laver Control. Network Modeling. Traffic Modeling. Network	
	Measurements.	
	Simulation - Introduction to one Network Simulator for wireless sensor	
	network (NS2/NS3/Cooia /OMNET++/ Exata Cyber etc.)	
	Evolution of Software Defined Networking (SDN):	
	Separation of Control Plane and Data Plane: Concepts, Advantages and	
	Disadvantages. OpenFlow protocol. Control Plane: Introduction of	
	existing SDN Controllers including Floodlight and Open Davlight	_
IV	projects. Data Plane: Software-based and Hardware-based:	8
	Programmable Network Hardware, Programming SDNs: Northbound	
	Application Programming Interface. (Assignments related to	
	languages and tools)	
	Network Virtualization:	
	Concepts, Applications, Existing Network Virtualization Framework	
	(VMWare and others), (assignments related to Mininet based	
V	examples)	6
· ·	Network Functions Virtualization (NFV) and SDN: Network	
	architecture, NFV Infrastructure, NFV Management and Orchestration	
	(MANO), NFV and SDN	
	Data Center Networks:	
	Data Center Networks: Packet, Optical and Wireless Architectures,	
VI	Network Topologies.	6
	Use Cases of SDNs: Data Centers, Backbone Networks, Home	
	Networks, Traffic Engineering.	
	Textbooks	
1	Sunilkumar S., Mahabaleshwar Manvi, Kakkasageri S., "Wireless and N	Aobile Networks:
	Concepts and Protocols", Wiley Second edition, 2016.	
2	Schiller J, "Mobile Communications", Addison Wesley, 2000.	
3	Stallings W, "Wireless Communications and Networks", Pearson Educat	tion, Schiller, 2005.
4	Nadeau Ihomas D., "SDN: Software Defined Networks, An Autho	ritative Review of
	Network Programmability Technologies", Ken Gray Publisher: O'Rei	lly Media, August
	2013.	. ~
5	Goransson Paul and Black Chuck, "Software Defined Networks:	A Comprehensive
	Approach", Morgan Kaufmann, June 2014.	
	Deferences	
	Stoimenic Ivan "Handbook of Wireless Networks and Mobile Computi-	ng" John Wiley
1	and Sons Inc 2002	ng, John Whey
	Yi Bing Lin and Imrich Chlamtac, "Wireless and Mobile Network Arch	itectures" John
2	Wiley and Sons Inc 2000.	
	······ ···· ··························	
3	Pandya Raj, "Mobile and Personal Communications Systems and Service	ces", PHI 2008.
5		

4	Dargie W Practice",	Dargie W. and Poellabauer C., "Fundamentals of Wireless Sensor Networks – Theory and Practice", Wiley 2010.						
5	Kazem So Protocols	Kazem Sohraby, Minoli Daniel and Znati Taieb, "wireless sensor networks -Technology, Protocols, and Applications", Wiley Interscience, 2007.						
6	Hara Taka Technolo	Hara Takahiro, Zadorozhny Vladimir I, and Buchmann Erik, "Wireless Sensor Network Technologies for the Information Explosion Era", Springer, 2010.						
Useful Links								
	•		CO-PO	) Mapping				
			Progra	amme Outcon	nes (PO)			
	1	2	3	4	5	6		
CO1			2	3				
CO2			2	1		2		
CO3			2	1		2		
CO4	2				3	2		
The streng Each CO c	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.							

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)							
		Course	Information	n			
Programme M.Tech. (Computer Science and Engineering)							
Class, Ser	nester	First Year M	. Tech., Sem	<u> </u>			
Course Co	ode	7CO518					
Course N		Cloud commu	tina				
Course Na Desired B	ame Poquisitos:	Cloud compu	ung stom Comp	utor Notworks			
Desireu N	equisites:	Operating Sy	stem, comp				
Те	aching Scheme		Examir	nation Scheme (Mar	·ks)		
Lecture	3 Hrs/week	MSE	ISE	ESE	Total		
Tutorial	-	30	20	50	100		
				Credits: 3			
		Course	Objectives				
1	To providing basic idea	as and principle	es in cloud n	nanagement techniqu	es, virtualization		
2	techniques and cloud software deployment consideration.						
3	To understand the Clot	levelonment					
	To understand the clou						
At the end	of the course, the studen	nts will be able	to,				
	,		,	D1	Bloom's		
СО	Course Outco	ome Statement	t/s	Bloom's Taxonomy Level	Taxonomy Description		
CO1	explain fundamental cl	oud computing	g concepts,				
	deployment models an	d business imr	options,	11	Understanding		
CO2	use virtualization tool	s and techniq	ues within	TT	Applying		
	cloud service providers	is and compar	e annerent	111			
CO3	assess the reliability se	<u>, ecurity perform</u>	nance and		Analysing		
000	scalability of cloud	d services	and their	IV	i mai j sing		
	management tools.						
CO4	evaluate cloud-based a	applications ar	nd services		Evaluating		
	using case studies	to determ	ine their	V			
	effectiveness in impro	ving cost efficient	ciency and	, v			
	business operations.						
Module		Module Co	ntents		Hours		
	Introduction to Clo	ud Technolog	gies				
т	Introduction to the	Cloud Cor	nputing, H	History of cloud	C		
	computing, Cloud se	rvice options,	Cloud Dep	ployment models,	O		
	Business concerns in	the cloud.	-				

II	<b>Virtualization and Cloud Platforms</b> Exploring virtualization, Load balancing, Hypervisors, Machine imaging, Cloud marketplace overview, and Comparison of Cloud providers.	7					
III	<b>Cloud Applications</b> Technologies and the processes required when deploying web services, Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages.	7					
IV	<b>Cloud Service Management</b> Reliability, availability, and security of services deployed from the cloud. Performance and scalability of services, tools, and technologies used to manage cloud services deployment.	6					
V	<b>Cloud IT Model</b> Analysis of Case Studies when deciding to adopt cloud computing architecture. How to decide if the cloud is right for your requirements. Cloud-based service, applications, and development platform deployment so as to improve the total cost of ownership (TCO).	6					
VI	Case Studies Google App Engine(GAE) - GAE Architecture - Functional Modules of GAE - Amazon Web Services(AWS) - GAE Applications - Cloud Software Environments - Eucalyptus - Open Nebula - Open Stack.	7					
Textbooks							
1	1 Cloud Computing: Concepts, Technology & Architecture (The Pearson Service Technology Series from Thomas Erl) Hardcover – 23 May 2013						
2	2 Enterprise Cloud Computing: Technology, Architecture, Applications Paperback by Gautam Shroff14 October 2010.						
3	CLOUD COMPUTING A PRACTICAL APPROACH Paperback by 7 Velte, Robert Elsenpeter, 1 July 2017	Γoby Velte, Anthony					
	References						
1	Cloud Computing: Concepts, Technology & Architecture, 1/e Paperba January 2014	ck – by Erl, 1					
2	GautamShroff,"Enterprise Cloud Computing - Technology, Architectu Cambridge University Press, 2010.	re, Applications",					
3	Ronald L. Krutz, Russell Dean Vines ,"Cloud Security: A Comprehener Cloud Computing", Wiley- India, 2010.	sive Guide to Secure					
4	RajkumarBuyya, James Broberg, Andrzej M. Goscinski,"Cloud Comp Paradigms", Wiley, 1 Edition 2013. 2 3	uting: Principles and					
	Useful Links						
1	https://www.simplilearn.com/						
2	https://www.mygreatlearning.com/						
3	Barrie Sosinsky,"Cloud Computing Bible", Wiley-India, 2010.						
4	https://cloud.google.com/training						

	CO-PO Mapping							
		Programme Outcomes (PO)						
	1	2	3	4	5	6		
CO1	1							
CO2	2		2					
CO3			2	1				
CO4		1						
The streng Each CO o	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.							

	Walchand College of Engineering, Sangli					
			(Government Alded Autonomo AV 2024-25	us institute)		
			Course Informatio	n		
Progr	amme		M Tech (Computer Science	e and Engineeri	ng)	
Class	Semester		First Year M Tech Sem I		···6/	
Cours	e Code		7CO519			
Cours	e Name		Professional Elective- Inter	net of Things		
Desire	ed Requisi	tes:	Computer Networks			
	u nequisi		composer reconstruction			
	Teaching	Scheme	Exami	nation Scheme	(Marks)	
Lectu	re	03 Hrs/week	MSE	ISE	ESE	Total
Tutor	ial	-	30	20	50	100
				Credits: 03	I_	
		•				
			Course Objective	S		
1	To discust internet-o	ss various topics of-things (IoT).	related to wireless sensor ne	tworks significa	ant towards en	merging
2	To impart knowledge of hardware, operating systems, distributed systems, networking, security and databases required for IoT technology					
3	3 To illustrate wireless sensor network (WSN) /Internet of Things (IoT) specific issues such as					es such as
Course Outcomes (CO) with Bloom's Taxonomy Level						
At the	end of the	course, the stud	ents will be able to,			
со		Cours	se Outcome Statement/s		Bloom's Taxonom v Level	Bloom's Taxonomy Description
CO1	describe commun	requirements ication systems,	from emerging Smart protocols and middleware.	applications,	II	Understanding
CO2	compare IoT	and analyse cor	nmunication and network pro	otocols used in	III	Applying
CO3	assess a synchron	and evaluate ization, security	mechanisms and algorithm and localization in WSNs and	ms for time d IoT	IV	Analysing
CO4	evaluate security of	the impact of th of IoT systems.	ese trends on the scalability,	efficiency, and	v	Evaluating
Modu	ıle		<b>Module Contents</b>			Hours
Introduction and Applications: smart transportation, smart cities, smart Living, smart energy, smart health, and smart learning. Examples of research areas include for instance: Self-Adaptive Systems, Cyber Physical Systems, Systems of Systems, Software Architectures and Connectors, Software Interoperability, Big Data and Big Data Mining, Privacy and Socurity.06					06	

Ш	IoT Reference ArchitectureIntroduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.07Real-World Design Constraints- Introduction, Technical Design constraints hardware, Data representation and visualization, Interaction and remote control.07						
Ш	Industrial AutomationService-oriented architecture-based device integration, SOCRADES: realizingthe enterprise integrated Web of Things, IMC-AESOP: from the Web of Thingsto the Cloud of Things.Commercial Building Automation- Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercialbuilding automation in the future.						
IV	Hardware Platform for IoTHardware Platforms and Energy Consumption, Operating Systems, TimeSynchronization, Positioning and Localization, Medium Access Control,Topology and Coverage Control, Routing: Transport Protocols, NetworkSecurity Middleware, Databases						
V	<b>IOT Physical De</b> What is an IOT Interface and Pro	vices & Endpoin Device, Exempl gramming & IOT	<b>its</b> lary Device B Device.	oard, Linux on	Raspberry,	07	
VI	Recent trends in IoT with case studies:         Recent trends in sensor network and IOT architecture, Automation in Industrial       05         aspect of IOT.       05						
	1		Textbooks				
1	Mandler B., Barja Giordano, S. Faz Springer Internat October 27-29, 20	a J., Campista Mit zio, M. Somov, A ional Publishing, 015. Revised Selec	re, M.E., Cagá A. Vieriu, RL Second Interna cted Papers, Pa	_ová, D. Chaouc ., "Internet of T ational Summit, I art I	hi, H. Zeadal hings. IoT Ir IoT 360° 201	ly, S. Badra, M. nfrastructures", 5, Rome, Italy,	
2	Kyung, CM., International Pub	Yasuura, H. Liu, lishing,2017.	Y. Lin, YI	, "Smart Senso	ors and Syst	ems", Springer	
			Defer				
	1		Kelerences				
1	Hersent Olivier, I Applications and	Boswarthick David Protocols", Wiley	d , Elloumi Om /-Blackwell, Se	har, "The Interne cond Edition,20	t of Things: I 12	Key	
			Leoful Links				
1	https://online.com	ses.nptel.ac.in/no	c22 cs53/previ	ew			
		C	O-PO Mappin	g			
		Pr	ogramme Out	tcomes (PO)			
	1	2	3	4	5	6	
CO1	1		1		3		
CO2				3	1	2	
CO3	1			2		2	
CO4							
The streng	gth of mapping is to	be written as $1:$ I	Low, 2: Mediur	n, 3: High			
Each CO	of the course must	map to at least one	e PO.				

		Wal	chand College of Engine (Government Aided Autonomous	ering, Sa Institute)	ngli	
			AY 2024-25			
			Course Information			
Progra	amme		M.Tech. (Computer Science and	d Engineeri	ng)	
Class,	Semester	•	First Year M. Tech., Sem II			
Cours	e Code		7CO521			
Cours	e Name		Advanced Computer Algorithm			
Desire	ed Requis	ites:	Design and Analysis of Algorith	nms Basics		
	-					
	Teaching	Scheme	Examina	tion Schem	e (Marks)	
Lectu	re	3 Hrs/week	MSE IS	E	ESE	Total
Tutor	ial	-	30 2	0	50	100
				Credits: 0.	3	
		·				
			Course Objectives			
1	To intro	duce students to	the advanced methods of designing	ng and anal	ysing algorith	ns.
2	To allow	v students choose	e appropriate algorithm and use it	for a specif	ic problem.	
3	To impart knowledge of different classes of problems along with recent developments in the area of					
5	algorithmic design.					
4		~				
A ( 1	1 6 4	Cours	e Outcomes (CO) with Bloom's	Taxonomy	Level	
At the	end of the	e course, the stud	ents will be able to,		Dla arra?a	Dlaam?"
CO		Cours	se Autcome Statement/s	Diuoiii S Tevonomy	DIUUIII'S Tayonomy	
		Cours	se Outcome Statement/s	Level	Description	
CO1	understa	nd basic concept	s of algorithm		II	Understanding
CO2	apply al	gorithms involvi	ng different strategies for problen	n solving	III	Applying
CO3	analyse	algorithm for giv	en problem at hand	0	IV	Analysing
<b>CO4</b>	evaluate	the complexity	of the algorithm		V	Evaluating
Modu	ıle		Module Contents			Hours
	Elen	nentary Algorith	nms			
	Sorti	ing: Review of v	arious sorting algorithms		<b>C1</b>	
	Gra	oh: Topological	sorting, Definitions and Elementa	ry Algorith	ms: Shortest	8
	path	by BFS, shortest	path in edge-weighted case (Dijks	stra's), depti	n-first search	
and computation of s			and time/anece enclosis, even	npnasis or	correctness	
	amor	tized analysis	in and time/space analysis, examp			
	Grai	oh Algorithms				
	Mat	roids: Introducti	on to greedy paradigm, algorithm	to comput	e a maximum	
II	weig	ht maximal inde	pendent set. Application to Minin	num Spanni	ng Tree.	6
	Shor	test Path in C	Graphs: Floyd-Warshall algorith	hm and in	troduction to	
	dyna	mic programmin	g paradigm. More examples of d	ynamic prog	gramming.	

	Parallel Algorith	ms						
	Introduction. Data	a and Temporal r	oarallelism. RAM	A and PRAM Mo	odel. Shared			
III	Memory and Mes	x Sum, List	7					
	Ranking, Merging	g two sorted lists	, Matrix multipl	ication, Analysis	of PRAM			
	Algorithms.	- -						
	Modulo Represe	ntation and DF	Т					
	Modulo Represen	tation of integers	s/polynomials: C	Chinese Remaind	er Theorem,			
IV	Conversion betwe	en base-represe	ntation and mod	lulo- representat	ion, Powers	7		
1,	of an element, Th	e RSA public-ke	y cryptosystem.			,		
	Discrete Fourier I	ransform (DFT)	: In complex fie	ld, DFT in modul	lo ring. Fast			
	Fourier Transform	h algorithm.						
	NP-completeness	of complexity	alassas D ND	ND Hard ND	Complete			
	Examples Proof	of NP-hardness a	and NP-complete	, INP-паги, INP	Complete,			
v	One or more of th	e following topi	cs based on inte	rest- Approximat	tion	6		
	algorithms Rando	mized Algorith	ms Interior Poir	t Method Adva	nced			
	Number Theoretic							
	Trumber Theorem	2 rugorum						
	Recent Trends							
VI	Recent Trends in problem solving paradigms using recent searching and sorting							
	techniques by applying recently proposed data structures.							
1	C. R. Kothari, Re	search Methodol	Ogy, New Age 1	nternational	ants and assas	Vilroe Dubliching		
2	House New Delh	ia Neena Sonan	i, Research Met	nouology : Conc	epts and cases,	, vikas Puolisiilig		
	Tiouse, New Deni	1						
			References					
1	Kleinberg and Ta	rdos, <i>Algorithm</i>	Design, Pearson	Education Limit	ted			
2	Robert Sedgewick	, "Algorithms in	r C + +", Addison	n-Wesley Profess	sional, Third E	dition		
	·							
			Useful Links	6				
1	NPTEL Videos of	f <b>'Data Structure</b>	es and Algorithn	<i>ıs</i> ' Course: <u>Link</u>				
			CO-PO Mappi	ing				
			Programme O	utcomes (PO)				
	1	2	3	4	5	6		
CO1	2							
CO2	2		-			ļ		
CO3	2	3	2					
CO4	2	1	1					
The streng	gth of mapping is to	be written as 1:	Low, 2: Medium	n, 3: High				
Each CO	of the course must i	nap to at least or	ne PO.					

	Walchand College of Engineering, Sangli							
			AY 2024-25		,			
			Course Informati	on				
Progra	amme		M.Tech. (Computer Scienc	e and Eng	gineerir	ng)		
Class,	Semes	ter	First Year M. Tech., Sem	Ī	<i></i>	<u></u>		
Cours	e Code		7CO524					
Cours	e Nam	9	High Performance Comput	ing				
Desire	ed Requ	usites:	Data structures, Basic Prog	ramming	knowle	edge		
				<u> </u>				
	Teachi	ng Scheme	Exami	nation S	cheme	(Marks)		
Lectur	re	3 Hrs/week	MSE	ISE		ESE	Total	
Tutor	ial	-	30	20		50	100	
				Cred	its: 3			
			·					
			Course Objective	es				
1	Introd	uce fundamental p	arallel computing concepts a	nd types of	of paral	lelism.		
2	Explo	re current trends in	shared memory and manyco	re/multic	ore arcl	hitectures.		
3	3 Explore current trends in shared memory and manycore/multicore architectures.							
4	4 Cover performance optimization techniques for high-performance parallel programs.							
	Course Outcomes (CO) with Bloom's Taxonomy Level							
At the	At the end of the course, the students will be able to,							
CO		Com	an Outraama Statamantla			Bloom's	Bloom's	
		Cour	e Outcome Statement/s			I axonom	y Laxonomy Description	
CO1	Desig	n efficient parallel	algorithms for matrix graph	and sorti	nσ		Applying	
	opera	ions, demonstratin	g proficiency in task decomp	osition ar	nd		rippijing	
	synch	ronization.	8 promotorio fini unon accomp	00101011 01				
CO2	Evalu	ate and predict the	performance of parallel prog	rams usin	ıg	V	Evaluating	
	analy	ical models, consid	dering scalability, load balance	ing, and	0		6	
	comm	unication overhead	d.					
<b>CO3</b>	Imple	ment algorithms us	sing programming models sui	ted for sh	ared	III	Applying	
	and di	stributed memory	systems, showcasing versatil	ity in				
	applic	ation across different	ent parallel architectures.					
<b>CO4</b>	Optin	ize efficiency of p	arallel algorithms for matrix,	graph, an	ıd	V	Evaluating	
	sortin	g tasks, achieving o	enhanced speedup, scalability	, and red	uced			
	comm	unication costs on	parallel systems.				TT	
Wiodu		4	Noquie Contents				Hours	
I	In In Pl Pa	plicit Parallelism, atforms, Physical C rallel Machines. R	Limitations of Memory, Dich Drganization of Parallel Platfo outing Mechanisms for Inter	notomy of rms, Com connectio	Paralle munica	el Computin ation Costs i vorks, Impac	g n 6 ct	
	of Process-Processor Mapping and Mapping Techniques							

	Principals of Pa	rallel Algorithm	Design				
	Decomposition T	echniques Chara	cteristics of Tas	sks and Interaction	ons Manning		
	Techniques for L	oad Balancing M	ethods for Cont	aining Interactio	n Overheads		
II	Parallel Algorith	um Models Basi	c Communica	tion Operations	· One-to-All	7	
	Broadcast and Al	1-to-One Reduction	on All-to-All F	Broadcast and Re	eduction All-		
	Reduce and Prefi	x-Sum Operation	s. Scatter and G	ather			
	Analytical Mode	ling	s, seatter and e				
	Performance Met	trics for parallel s	systems. The ef	ffect of Granula	rity and Data		
III	Mapping on Perf	formance. The So	calability of pa	rallel systems. I	so efficiency	6	
	metric of scalabil	ity, sources of par	allel overhead,	Minimum execu	tion time and	-	
	minimum cost-op						
	Parallel Program	nming					
	OpenMP, MPI,	CUDA/OpenCL,	Chapel, etc. T	hread basics .W	Vork Sharing		
** 7	constructs, Sche	onization &	-				
IV	Barriers, The MPI Programming Model, MPI Basics, Global Operations,						
	Asynchronous Communication, Modularity, Other MPI Features Basic of						
	GPGPU, CUDA	Programming mo	del, CUDA mei	mory type Perfor	mance Issues		
	Dense Matrix Al	gorithms				-	
V	Matrix-Vector N	Jultiplication, M	atrix-Matrix M	ultiplication So	rting: Issues,	6	
	Sorting Networks, Bubble Sort and its Variants, Quicksort						
	Graph Algorith	ns					
VI	Definitions and	Representation, N	Minimum Span	ning Tree: Prim	's Algorithm,	6	
	Single-Source Shortest Paths: Dijkstra's Algorithm, All-Pairs Shortest Path						
Textbooks							
1	Grama Ananth, C	Supta Anshul, Geo	orge Karypis, ar	nd Vipin Kumar,	Introduction to	o Parallel	
1	<sup>1</sup> Computing, Addison Wesley (2nd ed.),.						
2	Buyya Raijkumar	, High Performan	ce Cluster Con	puting : Program	nming and App	olications,	
	Volume 2, Printic	e Hall PTR Uppe	er Saddle River,	New Jersey			
3	Cook shane, CUI	DA Programming:	: A Developer's	Guide to Paralle	el Computing v	vith GPUs	
			References				
1	Michael J. Quinn	, Parallel Program	nming in C with	MPI and Open	MP, McGraw-I	Hill.	
			Useful Links	4000 4 4 4			
<u> </u>	High Performanc	e Computing, Cha	arles Severance	, 1998. Link			
2	Marc Snir, Steve	Otto, Steven Hus	s-Lederman, Da	avid Walker, and	I Jack Dongarra	a, MPI: The	
	Complete Referen	nce, 1996. Link		1007 1 1			
3	Ian Foster, Desig	ning and Building	g Parallel Progra	ams, 1995. Link			
		C	O DO Mannin	<i>a</i>			
		C		$\frac{g}{DO}$			
	1		rogramme Out	comes (PO)	5		
	1	Ζ	3	4	3	0	
	1	2	2	1			
	1	2	2	1			
CO3	2		3	2		1	
<u>CO4</u>		2		3	2		
The streng	gth of mapping is to	be written as 1:	Low, 2: Mediur	n, 3: High			
Each CO	of the course must	map to at least on	e PO.				

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
	AY 2024-25								
			Course l	Information					
Progra	amme		M.Tech. (Compu	ter Science and Engineeri	ng)				
Class,	Semester		First Year M. Tec	ch., Sem I					
Cours	e Code		7CO523						
Cours	e Name		Information Secu	rity					
Desire	d Requisi	tes:	Data Communica	tion, Computer Networks					
	Teaching	Scheme		Examination Scheme	(Marks)				
Lectur	re	3 Hrs/week	MSE	ISE	ESE	Total			
Tutor	ial	-	30	20	50	100			
				Credits: 3					
			·						
			Course	Objectives					
1	To learn	the fundamental	s of cryptography a	and is applications to netw	vork security				
2	To under	stand network s	ecurity threats, issu	es, security issues and co	untermeasures				
3	To unde	erstand vulneral	oility analysis of	network security with	the help of	trade-offs and			
	criteria/c	oncerns for secu	rity countermeasur	e development	-				
4	4   To apply methods for authentication, access control, intrusion detection and prevention								
Atthe	and of the	Course	Outcomes (CO) w	ith Bloom's Taxonomy	Level				
At the		course, the stud	ents will be able to	,	Ploom's	Ploom's			
CO		Cours	e Outcome Staten	nent/s	Taxonomy	Taxonomy			
		Court	Level	Description					
CO1	explain t	he risks faced by	computer systems	and networks	II	Understandin			
CO2	identify	and analyze see	curity problems in	computer systems and	III	Applying			
CO3	develop	security mecha	nisms to protect	computer systems and	IV	Analyzing			
CO4	use cryp	tography algori	thms and protoco	ls to achieve computer	v	Evaluating			
	security			security					
Modu									
	le		Module (	<sup>7</sup> ontents		Hours			
lilloud	lle Intro	duction to Info	Module ( rmation Security:	Contents		Hours			
Ι	lle Intro Atta	duction to Info	Module ( rmation Security: y, Security Goals,	Contents Security Services and med	chanisms.	Hours 5			
I	le Intro Atta Conv	duction to Info cks, Vulnerabilit entional Crypt	Module ( rmation Security: y, Security Goals, ographic Techniq	Contents Security Services and measures	chanisms.	Hours 5			
I	le Intro Atta Conv Conv	duction to Info cks, Vulnerabilit entional Crypt entional substitu tream Cipher S	Module ( rmation Security: y, Security Goals, ographic Techniq tion and transpositi	Contents Security Services and mea ues: ion ciphers, One-time Pad	chanisms. , Block cipher	Hours           5           6			
I II	lle Intro Atta Conv and S	duction to Info cks, Vulnerabilit rentional Crypt entional substitu tream Cipher, S netric and Asy	Module ( rmation Security: y, Security Goals, ographic Techniq tion and transpositi teganography mmetric Cryptog	Contents Security Services and mea ues: ion ciphers, One-time Pad raphic Techniques:	chanisms. , Block cipher	Hours 5 6			
I II III	lle Intro Atta Conv and S Sym DES,	duction to Info eks, Vulnerabilit entional Crypt entional substitu tream Cipher, S netric and Asyn AES, RSA algo	Module ( rmation Security: y, Security Goals, ographic Techniq tion and transpositi teganography mmetric Cryptogr rithms	Contents Security Services and mea ues: ion ciphers, One-time Pad raphic Techniques:	chanisms. , Block cipher	Hours           5           6           7			
	lle Intro Atta Conv and S Syma DES, Auth	duction to Info cks, Vulnerabilit entional Crypt entional substitu tream Cipher, S netric and Asyn AES, RSA algo entication and	Module ( rmation Security: y, Security Goals, ographic Techniq tion and transpositi teganography mmetric Cryptogr orithms Digital Signatures	Contents Security Services and mea ues: ion ciphers, One-time Pad raphic Techniques:	chanisms. , Block cipher	Hours           5           6           7			

v	<b>Program Security:</b> Non-malicious Program errors– Buffer overflow, Incomplete mediation, Time- of-check to Time-of use Errors, Viruses, Trapdoors, Salami attack, Man-in-the middle attacks, Covert channels	5				
VI	Security in Networks: Threats in networks, Network Security Controls– Architecture, Encryption, Content Integrity, Strong Authentication, 20 Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls– Design and Types of Firewalls, Personal Firewalls, IDS, Email Security PGP, S/MIME	6				
	Textbooks					
1	Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Educatio	n				
2	2 Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson					
3	Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall.					
4	Network Security Essentials: Applications and Standards, by William Stallings. I	Prentice Hall.				
	References					
1	The Complete Reference - Network Security Roberta Bragg, Mark Rhodes-O Strassberg, Reprint 2007	usley & Keith				
2	Applied Cryptography, Second Edition: John Wiley and Sons, Inc.,					
	Useful Links					
1	https://archive.nptel.ac.in/courses/106/106/106106129/					
2	https://www.classcentral.com/course/openlearn-science-maths-technology-inform security-96035	nation-				

	CO-PO Mapping											
Programme Outcomes (PO)												
	1	2	3	4	5	6						
CO1	2		1									
CO2	2	2	2		2	2						
CO3		2				2						
CO4	2	2		2		2						
The streng	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High											
Each CO	of the c	ourse 1	must m	ap to at	least c	one PO.						

		Wal	chand College (Government Aid	e of Engineerin ed Autonomous Instit	ng, Sang	gli	
	AY 2024-25						
			Course	e Information			
Progra	amme		M.Tech. (Compu	ter Science and Eng	gineering)	)	
Class,	Semester		Second Year M.	Гесh., Sem II			
Cours	e Code		7CO571				
Cours	e Name		Advanced Compu	ter Algorithm Lab			
Desire	ed Requisi	tes:	Design and Analy	sis of Algorithms	Basics, Pr	ogramming	
	Teaching	Scheme		Examination	Scheme (	Marks)	
Practi	cal	2 Hrs/ Week	LA1	LA2	Lab 1	ESE	Total
Intera	ction	-	30	30	4(	) (	100
				Cre	dits: 01	· · ·	
			·				
			Cours	e Objectives			
1	To introd	luce students to	the advanced meth	ods of designing a	nd analysi	ng algorithms	•
2	To allow	students choose	e appropriate algor	ithm and use it for	a specific	problem.	
2	To impar	t knowledge of	different classes of	f problems along w	ith recent	developments	s in the area of
3	algorithn	nic design.					
		Cours	e Outcomes (CO)	with Bloom's Tax	onomy L	evel	
At the	At the end of the course, the students will be able to,						
		~				Bloom's	Bloom's
CO		Cou	rse Outcome State	ement/s		Taxonomy	Taxonomy
<u>CO1</u>	opply ala	orithm to colvo	nrohlam				Applying
$\frac{CO1}{CO2}$	apply arg	lgorithms invol	ving different strat	egies for problem s	olving	III	Applying
CO2	evaluate	the complexity	of the algorithm	egies for problem s	lorving	V	Evaluating
CO4	develop	the solution for	open-ended proble	ms and document i	t	VI	Creating
	<b>_</b>	]	List of Experimen	ts / Lab Activities/	/Topics		6
	<ol> <li>Imp</li> <li>10. Imp</li> <li>11. Imp</li> </ol>	olement various olement BFS alg olement DFS alg olement Dijkstra olement kruskal olement Floyd-V olement matrix r olement CRT. olement RSA alg olement Fourier olement P-NP, N	algorithms. gorithm. gorithm. a algorithm. Varshall algorithm. nultiplication. gorithm. transform algorithm. NP-Hard.	m.			
			T	extbooks			
1	Corm Algor	en Thomas H. rithms PHI, Thi	, Leiserson Charle rd Edition, 2009	es E., Rivest Rona	ald L., St	ein Clifford,	Introduction to
2	Aho, Pub.C	Hopcroft, Ullm Co., 1974.	an, The Design and	l Analysis of Comp	outer Algo	orithms, Addis	on-Wesley

References						
1	Kleinberg and Tardos, Algorithm Design, Pearson Education Limited					
	Useful Links					
1	NPTEL Videos of 'Data Structures and Algorithms' Course: Link					

	CO-PO Mapping									
	Programme Outcomes (PO)									
	1	2	3	4	5	6				
CO1	2									
CO2	2	1	2							
CO3	2	1			3	2				
CO4	2	1								
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High										
Each CO	O of the course	e must map to at lea	st one PO, and p	referably to only	one PO.					

Assessment									
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.								
IMP: Lab ESE	IMP: Lab ESE is a separate head of passing (min 40 %), LA1+LA2 should be min 40%								
Assessment	Assessment Based on Conducted by Typical Schedule Mark								
	Lab activities,		During Week 1 to Week 8						
LA1	attendance,	Lab Course Faculty	Marks Submission at the end of	30					
	journal		Week 8						
	Lab activities,		During Week 9 to Week 16						
LA2	attendance,	Lab Course Faculty	Marks Submission at the end of	30					
	journal		Week 16						
	Lab activities,	Lab Course Faculty and	During Week 18 to Week 19						
Lab ESE	journal/	External Examiner as	Marks Submission at the end of	40					
	performance	applicable	Week 19						
Week 1 indicate	es starting week o	f a semester. Lab activities/	Lab performance shall include perfo	rming					
experiments, m	ini-project, preser	ntations, drawings, program	ming, and other suitable activities, a	s per the					
nature and requ	irement of the lab	course. The experimental	lab shall have typically 8-10 experim	ents and					
related activitie	es if any.								

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
	AY 2024-25									
			Course	Information						
Prog	ramme		M.Tech. (Comp	uter Science and en	gineering)					
Class	s, Semeste	er	First Year M. Te	ech., Sem II						
Cour	se Code		7CO574							
Cour	se Name		High Performan	ce Computing Lab						
Desir	ed Requi	sites:	Data structures,	Basic Programming	g knowledge					
	Teaching	g Scheme		Examination	Scheme (Ma	arks)				
Prace	tical	2 Hrs/ week	LA1	LA2	Lab ES	SE	Total			
Inter	action	-	30	30	40		100			
				Cre	dits: 1					
			Cours	e Objectives						
1	To prov	vide basics of par	callel architectures							
2	To prov	vide basics of par	allel algorithm des	ign and analysis						
3	To prov	vide basics of par	callel programming	platforms						
		Course	e Outcomes (CO)	with Bloom's Tax	onomy Leve	1				
At the	e end of th	e course, the stu	dents will be able t	0,						
со		Сог	ırse Outcome Stat	ement/s		Bloom's Taxono my	Bloom's Taxono my			
						Level	Description			
C01	illustrat	te different paral	lel programming te	chniques		III	Applying			
CO2	measur	e performance of	f model using diffe	rent metrics		III	Applying			
CO3	analyze improv	and apply different apply different e its performance	ent parallel strateg	ies to a parallel pro	gram to	VI	Analyzing			
CO4	design	a parallelization	strategy for compu	ting patterns on dif	ferent	VI	Analyzing			
	hardwa	re and using diff	erent parallel comp	outing languages.						

# List of Experiments / Lab Activities/Topics

List of Lab Activities:

A. Implementation of following tasks using OpenMP.

- 1. Implementation of sum of two lower triangular matrices.
- 2. Implementation of Matrix-Matrix Multiplication.
- 3. Implementation of dot product
- 4. Implementation of Prefix sum
- B. Implementation of following tasks using MPI.
  - 5. Implementation of Matrix-Vector Multiplication.
  - 6. Implementation of Matrix-Matrix Multiplication.
  - 7. Implementation of 2D Convolution
  - 8. Implementation of dot product
  - 9. Implementation of Prefix sum

C. Implementation of following tasks using CUDA.

# 10. Implementation of Matrix-matrix Multiplication using global memory.

- 11. Implementation of Matrix-Matrix Multiplication using shared memory.
- 12. Implementation of Histogram
- 13. Implementation of Odd even sort
- 14. Implementation of Prefix sum
- 15. Implement 2D Convolution using shared memory

D. Performance evaluation of following computations using open-source libraries or OpenACC compare to sequential and explicit parallel implementation

16. Implementation of Matrix-Matrix multiplication using OpenACC MKL, and cuBLAS.

Compare their performance with OpenMP based implementation from assignment no.2, 10 and 11.

	Textbooks
1	Zbigniew J. Czech, Introduction to Parallel Computing, Cambridge University Press, 2016.
2	Kumar, V., Grama, A., Gupta, A., & Karypis, G. (1994). Introduction to parallel computing (Vol. 110). Redwood City, CA: Benjamin/Cummings.
3	Chandra, R., Dagum, L., Kohr, D., Menon, R., Maydan, D., & McDonald, J. (2001). Parallel programming in OpenMP. Morgan kaufmann.
4	Cheng, J., Grossman, M., & McKercher, T. (2014). Professional CUDA c programming. John Wiley & Sons.
	References
1	Michael Quinn, Parallel Computing: Theory and Practice, McGrawHill Publishers, July 2017.
2	Arch Robison, James Reinders, and Michael Macoul, Structured Parallel Programming: Patterns for Efficient Computation, Morgan Kaufman, Elsevier, 2012.
	Useful Links

CO-PO Mapping														
		Programme Outcomes (PO)												
	1	2	3	4	5	6								
CO1	2													
CO2	2													
CO3				2	2									
CO4				2	2									
The st	The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High													
Each C	CO of th	ne cours	se must	map to	o at leas	st one P	O, and	prefera	bly to o	only on	e PO.			

	Assessment									
There are thre	e components of l	ab assessment, LA1, LA2 a	nd Lab ESE.							
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%										
Assessment	Based on	Conducted by	Typical Schedule	Marks						
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30						
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30						
Lab ESE	Lab activitie s, journal/ performanc e	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40						
Week 1 indica experiments, r nature and req and related act	ites starting week nini-project, prese uirement of the la tivities if any.	of a semester. Lab activities entations, drawings, program b course. The experimental	Algorithms with the second state of the second	orming as per the nents						

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)													
	AY 2024-25													
	Course Information													
Progra	amme		M.Tech. (Comput	ter Science and Eng	gineering)	)								
Class,	Class, Semester First Year M. Tech., Sem II													
Cours	Course Code 7CO545													
Cours	e Name		Pre-Dissertation V	Work and Seminar										
Desired Requisites:														
1	Teaching	Scheme		Examination	Scheme (	Marks)								
Practi	cal	2 Hrs/ Week	LA1	LA2	Lab 1	ESE	Total							
Intera	ction	-	30	30	40	) (	100							
				Cre	dits: 1									
			Cours	e Objectives										
1	Develop	advanced resea	rch skills in compu	ter science enginee	ring.									
2	Enhance	the ability to cr	itically review and	synthesize existing	literature	e in a chosen a	rea of study							
3	Improve	technical writin	g skills for produci	ing high-quality res	earch pro	posals and rep	orts.							
4	Strengthe	en presentation	skills for effectively	y communicating r	esearch fi	ndings and ide	eas.							
Atthe	and of the	Cours	e Outcomes (CO)	with Bloom's Tax	onomy L	evel								
At the		course, the stud	ients will be able to	),		Ploom's	Ploom's							
СО		Cou	rse Outcome State	ement/s		Taxonomy Level	Taxonomy Description							
CO1	conduct a engineeri	idvanced resear	ch in a specific are	a of computer scier	nce	III	Applying							
CO2	critically opportun	analyze and synthesistic synthemic synthesis and synthesis for further	nthesize literature t research.	o identify gaps and		IV	Analysing							
CO3	produce clear, cor	high-quality rencise, and accur	search proposals a ate writing.	and technical repo	rts with	III	Applying							
CO4	deliver e ideas clea	ffective present arly and persuas	ations to communi sively.	icate research findi	ngs and	V	Evaluating							
		]	List of Experiment	ts / Lab Activities/	<b>Topics</b>									
List of This co advance	f Lab Actinourse designed researc	vities: ned to provide h and professio	students with both nal practice in the f	theoretical knowled field of Computer S	dge and p science Ei	ractical skills ngineering.	necessary for							
	Textbooks													
1 Suitable books based on the contents of the topic.														
	Suital	ole books based	on the contents of	the topic.										
	Suital	ble books based	on the contents of											
	Suital	ble books based	on the contents of <b>Re</b>	eferences	daaaaaaa	h nonora from	nonuted national							
1	Suital Suital and in	ole books based ole books based aternational jou	on the contents of <b>Re</b> on the contents of t rnals and conference	eferences he selected topic ar ces.	nd researc	h papers from	reputed national							
1	Suital	ole books based ole books based aternational jou	on the contents of Record on the contents of trans and conference	eferences he selected topic ar ces.	id researc	h papers from	reputed national							
1	Suital	ble books based ble books based aternational jou	on the contents of <b>Re</b> on the contents of t rnals and conference <b>Use</b>	eferences the selected topic ar ces. eful Links	nd researc	h papers from	reputed national							

CO-PO Mapping										
	Programme Outcomes (PO)									
	1	2	3	4	5	6				
CO1		3	1							
CO2		3	1							
CO3		3	1							
CO4				2	1	1				
The stre	ngth of mappi	ng is to be written a	s 1.2.3: where. 1	: Low. 2: Medium	n. 3: High					

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

	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	Based on	Conducted by	Typical Schedule	Marks					
	Lab activities,		During Week 1 to Week 8						
LA1	attendance,	Lab Course Faculty	Marks Submission at the end of	30					
	journal		Week 8						
LA2	Lab activities,		During Week 9 to Week 16						
	attendance,	Lab Course Faculty	Marks Submission at the end of	30					
	journal		Week 16						
	Lab activities,	Lab Course Faculty and	During Week 18 to Week 19						
Lab ESE	journal/	External Examiner as	Marks Submission at the end of	40					
	performance	applicable	Week 19						
Week 1 indicate	es starting week o	f a semester. Lab activities/	Lab performance shall include performance	rming					
experiments, m	ini-project, preser	ntations, drawings, program	ming, and other suitable activities, a	s per the					
nature and requ	irement of the lab	course. The experimental	lab shall have typically 8-10 experim	ents and					
related activitie	es it any.								

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
	AY 2024-25									
Course Information										
Progra	amme		M.Tech. (Computer Science	e and Engi	ineerin	g)				
Class,	Semester	ſ	First Year M. Tech., sem II							
Cours	e Code		7CO538							
Cours	e Name		Natural Language Processin	ıg						
Desire	ed Requis	ites:	Mathematics – Linear Algel	bra, Proba	bility [	Theory				
	Teaching	g Scheme	Exam	ination S	cheme	e (Marks)				
Lectur	re	Hrs/week	MSE	ISE	]	ESE	Total			
Tutor	ial	-	30	20		50	100			
				Cred	its: 03					
			Course Objectiv	ves						
1	To build	l AI applications	such that it will enable comp	uter to rea	d text,	hear speech	and interpret it			
2	To acqu	aint students with	n the basics of text processing	5						
3	To illust	rate steps involv	ed in building text mining app	olications						
4	To share	e the importance	of different set of features for	machine	learnir	ng tasks				
At the	and of the	Course the stud	e Outcomes (CO) with Bloom	m´s laxo	nomy	Level				
At the	At the end of the course, the students will be able to, <b>Ploom's Ploom's</b>									
СО		Cours	se Outcome Statement/s			Taxonomy Level	Taxonomy Description			
CO1	explain	fundamental con	cepts of text processing			II	Understand			
CO2	apply te of text	xt processing alg	gorithms to derive different r	representa	tions	III	Apply			
CO3	automat models	e the real-life pro	blems by choosing appropria	te features	s and	IV	Evaluate			
CO4	develop	models for Infor	mation Retrieval and Chatbot	application	on	V	Creating			
	·						·			
Modu	ıle		Module Contents				Hours			
I	Intro Regu Norr Cosi pyth	Introduction, Steps Involved, Tokenization, Stemming, Lemmatization, Regular expressions- extraction of information using Regex, Text Normalization, Minimum edit distance, Document Similarity measures - 6 Cosine and cluster measures, exploration of python libraries like NLTK. SciPy re				6				
II	Lang Infor Intro Lang Mod mod	guage Models mation Retrieval duction, IDF, T guage lels, Spelling cort elling, POS taggi	& Language Models If-Idf, Boolean Model, Veo rection - Edit distance, Advar ng, Performance Measures, P	ctor Space nced smoo Precision, 2	e Mo othing Recall,	del, N-gram for language , F-measure	6			

ш	Distributed Wor Vector Space Mo Contextual Embe WordNet	Distributed Word Representation Vector Space Model - word vectors, GloVe/Word2Vec model, word embedd Contextual Embeddings, Deriving Word Vectors from Corpus, Word Senses WordNet						
IV	<b>Text Classificati</b> Constituency G Dependency Pars Models, Sentimer	Text ClassificationConstituency Grammars, Context-Free Grammar, Constituency Parsing, Dependency Parsing, Lexicons for Sentiment, Distributional Semantics, Topic4Models, Sentiment Classification						
v	Sequence Classification5Sequence Labelling for Parts of Speech and Named Entities, Deep Learning5Architectures for Sequence Processing, Models for Sequential tagging –5MaxEnt, CRF, Recurrent Neural network relevant to NLP5							
VI	VI Case Study Machine Translation and Encoder-Decoder Models, Discourse Coherence, Question Answering, Chatbots & Dialogue Systems, Sentiment Analysis and Opinion Mining, Text Generation using Language Models							
	Cturry D'al Free	- V1 1 F 1-	Textbooks		· · ·,			
1	O'reilly Publications, 2009.							
2	2 Yoav Goldberg, " <i>Neural Network Methods for Natural Language Processing</i> ", Synthesis Lectures on Human Language Technologies, 2017							
			References					
1	Dan Jurafsky and Edition, 2020	James H. Martir	n, "Speech and I	Language Process	<i>ing</i> ", Standfo	rd University, 3 <sup>rd</sup>		
2	Jason Brownlee,	"Deep Learning j	for Natural Lan	guage Processing	", 2017.			
1	NI D Course on N	DTEL · Link/httr	Useful Links	s no notal an in/non1	0 0056/provi	<u></u>		
		<u>(1 1 L'L', <u>L'IIIK</u>(IIII)</u>	55.//OIIIIIECOUIS	-5.11ptc1.ac.111/110C1	<u>previ</u>			
	1		CO-PO Mappi	ng				
			Programme O	utcomes (PO)				
	1	2	3	4	5	6		
C01	1							
CO2	2		3					
CO3		1	2	1				
CO4	ath of morning is to	l	Low 2. Madin	n 2. Uiah				
Fach CO	gui of mapping is to	b be written as 1:	Low, 2: Mediui	n, 5: riigh				
	of the course must	map to at least of	IC FU.					

		Wald	chand College (Government Aided	of Engineering	, Sangli		
			AY	2024-25			
			Course	Information			
Program	me		M. Tech. (Compu	ter Science and Eng	ineering)		
Class, Ser	mester		First Year M. Tec	h., Sem II			
Course C	ode		7CO533				
Course N	ame		Professional Elect	tive: Blockchain Teo	chnology		
Desired Requisites:			Basics of mathem	atics, and security a	algorithms		
			1				
Teac	hing Sche	me		Examination S	Scheme (Marks	s)	
Lecture		3 Hrs/week	ISE	MSE	ESE		Total
Tutorial		-	20	30	50		100
Practical		-		]	Nil		
Interaction	on	-		Cre	dits: 3		
			Course	Objectives			-
1	Unde	erstand the fund	amental concepts of	f blockchain technol	ogy, including o	lecentralizat	ion,
	Gain	insights into the	e cryptographic tech	niques used in bloc	kchain such as	hashing and	digital
2	signa	atures.	e eryptographie teel	inques used in bloc	Kenam, suen as	nashing and	urgitai
2	Exar	nine real-world	applications of bloc	kchain across indus	tries, including	finance, supp	ply chain,
3	and l	healthcare.					
At the one	loftha aa	Course	Outcomes (CO) w	with Bloom's Taxon	omy Level		
At the end		urse, the student	s will be able to,			Bloom's	Bloom's
СО		Course Outcome Statement/s				Taxonomy	Taxonomy
						Level	Description
CO1	descri	be cryptographi	ic techniques like	hashing and dig	ital signatures	II	Understandi
	used	in blockchain se	ecurity.	heriou og with hole o	favomnla	III	ng A pplying
	musu	ate the working	of cryptography tec	childres with help c	or example.	111	Apprying
CO3	desigr	n a basic smart	contracts using Sol	idity.		III	Applying
CO4	analyz	ze and compare	features of block	hain platforms like	Ethereum and	IV	Analyzing
	Hyper	ledger for differ	rent use cases	_			
Module			Module			Ho	urs
	Introduct	ion to Blockchy	Contents				
	Overview	of blockchain te	echnology and its co	ore principlesTypes	of blockchains:		
I	public, pr	rivate, and con	sortium Basics of	decentralization,	consensus, and	:	8
	immutabil	ity	•				
	Cryptogra	aphy and Secur	rity in blockchain: bas	hing digital signat	trac Concancilo		
П	mechanisr	ns: Proof of Wo	rk (PoW), Proof of	Stake (PoS)Security	considerations	:	8
	and vulner	rabilities in bloc	kchain				

	Sma	rt Cor	t Contracts and DApps												
тт	Intro	duction	to sm	art con	tracts a	ind the	ir bene	efits ditu mu		nina la					7
	Desi	reum v	rinles a	machi and dev	ne (Ev	wi) an	a Solla lecentr	uity pro	ogrami	mng 18	inguage DAnns	3 )			/
									apprice		Dripps	)			
	Bloc In-der	kchain	1 Platfe	orms a	nd Fra	amewo in platf	orks	Ethere	ım Hı	merled	ger Set	ting un			
IV	a deve	elopme	nt envi	ronme	nt for H	Ethereu	m or H	Hyperle	dger	perieu	ger bei	ung up			7
		· I ·					-	J1	0						
	Bloc	kchair	n Appli	cation	s and	Use Ca	ases	2				~			
* 7	Real	Real-world applications of blockchain in finance, supply chain, etc. C								c. Case			-		
V	Chal	Challenges and limitations of blockchain technology										/			
	DI	<u></u>						• •	,						
VI	Bloc	kchain	Devel	lopme	nt and	Capst	one Pi	oject	ntracte	Build	ing a	simple			6
V I	dece	ecentralized application (DApp) Students work on a blockchain-related							related	project			0		
	as a	capstor	ne		、 11	,						1 5			
			<u></u>	<b>*</b> * 1			Text	Books							
1	"Mas	tering l	Bitcoin	: Unlo	cking I	Digital	Crypto	ocurren	cies" b	y And	reas M.	Anton	opoul	os	
2	"Bloc	ckchain	Basics	s: A No	on-Tec	hnical	Introdu	lction 1	n 25 S	teps" b	y Dani	el Dres	cher		
							Refe	erences							
1	Bloc	kchain	Appli	cations	s: A Ha	nds-Oı	1 Appr	oach" l	oy Arsl	hdeep ]	Bahga a	and Vij	ay Ma	adisett	ĺ
2	"Bloc	ckchain	Basic	s: A Pr	actical	Appro	ach" b	y Pete ]	Harris						
							Usefu	ıl Link	s						
1	NPTI	EL Vid	eos												
						C	O-PO	Mapp	ing						
				P	Program	nme C	Outcon	nes (PC	<b>)</b> )		1				1
	1	2	3	4	5	6								ļ	
CO1	1			2											
CO2	2			3											
CO3	2			3											
CO4	1		1			2									
	-	The stre	ength o	f mapp	oing is	to be w	ritten	as 1,2,3	3; Whe	re, 1:L	ow, 2:1	Mediun	n, 3:H	igh	
				Each	CO of	the co	urse m	nust ma	p to at	least o	one PO.				

		Walc	hand College of Engin	eering,	San	gli			
			AY 2024-25	us msnune,	)				
	Course Information								
Progra	amme		M.Tech. (Computer Science	and Engi	neerin	g)			
Class,	Semester		First Year M. Tech., Sem II	[		<i>C</i> /			
Cours	e Code		7CO534						
Cours	e Name		Theory and Applications of	Remote S	ensing	g & GIS			
<b>Desired Requisites:</b> Fundamentals of Image processing									
	Teaching Scheme         Examination Scheme (Marks)								
Lectur	re	3 Hrs/week	MSE	ISE	SE ESE		Total		
Tutori	ial	-	30	20		50	100		
				Credit	ts: 3				
	I		Course Objective	s					
1	Introduce	e fundamental co	oncepts and principles of RS a	and GIS.					
2	Familiar	ze students with	RS and GIS data types and p	oroducts.					
3	Highligh	t advantages and	l diverse applications of RS a	nd GIS.					
4	Provide 1	practical experie	nce with RS and GIS software	e and data	analy	sis technique	s.		
		Course	Outcomes (CO) with Bloom	's Taxono	omy L	evel			
At the	end of the	course, the stud	ents will be able to,						
	Bloom's						Bloom's		
00	Course Outcome Statement/s Taxonomy						<b>T</b>		
CO		Cours	se Outcome Statement/s			Taxonomy	Taxonomy		
CO CO1	Understa	Cours	e Outcome Statement/s	S and GIS	5	Taxonomy Level	Taxonomy Description		
CO CO1	Understa	Cours	ze fundamental concepts in R	S and GIS	5	Taxonomy Level II	TaxonomyDescriptionUnderstanding		
CO CO1 CO2	Understa Interpret	Cours nd and summari and Apply vario	ze fundamental concepts in R	S and GIS	S IS	Taxonomy Level II III	TaxonomyDescriptionUnderstandingApplying		
CO CO1 CO2	Understa Interpret data and	Cours nd and summari and Apply vario GIS database m	ze fundamental concepts in R ous satellite RS data and demo anagement system	S and GIS	S IS	Taxonomy Level II III	TaxonomyDescriptionUnderstandingApplying		
CO CO1 CO2 CO3	Understa Interpret data and Compare	Cours and and summari and Apply vario GIS database m and examine da	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an	S and GIS	S IS	Taxonomy Level II III IV	TaxonomyDescriptionUnderstandingApplyingAnalysing		
CO CO1 CO2 CO3 CO4	Understa Interpret data and Compare Select an	Cours nd and summari and Apply vario GIS database m and examine da d Verify RS and	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to	S and GIS	S IS	Taxonomy Level II III IV V	Taxonomy DescriptionUnderstandin gApplyingAnalysingEvaluating		
CO CO1 CO2 CO3 CO4	Understa Interpret data and Compare Select an solution	Cours nd and summari and Apply vario GIS database m and examine da d Verify RS and for various intere	e Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS ar GIS data and data products to disciplinary problems	S and GIS onstrate G nd GIS design	S	Taxonomy Level II III IV V	Taxonomy DescriptionUnderstandin gApplyingAnalysingEvaluating		
CO CO1 CO2 CO3 CO4	Understa Interpret data and Compare Select an solution	Cours and and summari and Apply vario GIS database m and examine da d Verify RS and for various interc	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to disciplinary problems	S and GIS onstrate G nd GIS design	5 IS	Taxonomy Level II III IV V	Taxonomy DescriptionUnderstandin gApplyingAnalysingEvaluating		
CO CO1 CO2 CO3 CO4 Modu	Understa Interpret data and Compare Select an solution	Cours nd and summari and Apply vario GIS database m and examine da d Verify RS and for various interc	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to disciplinary problems Module Contents	S and GIS onstrate G nd GIS design	S IS	Taxonomy           Level           II           IV           V	Taxonomy DescriptionUnderstandin gApplyingAnalysingEvaluating		
CO CO1 CO2 CO3 CO4 Modu	Understa Interpret data and Compare Select an solution	Cours and and summari and Apply vario GIS database m and examine da d Verify RS and for various interce eepts and Found	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing	S and GIS onstrate G nd GIS design	S IS	Taxonomy Level II III IV V	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating		
CO CO1 CO2 CO3 CO4 Modu	Understa Interpret data and Compare Select an solution	Cours nd and summari and Apply vario GIS database m and examine da d Verify RS and for various interce epts and Found duction, Rem	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing ote Sensing System, I	S and GIS	5 IS	Taxonomy Level II III IV V	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating		
CO CO1 CO2 CO3 CO4 Modu	Understa Interpret data and Compare Select an solution Ile Conc Introd Elect	Cours nd and summari and Apply varie GIS database m and examine da d Verify RS and for various intere- tepts and Found duction, Remu- romagnetic Spec	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS ar GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing ote Sensing System, I ctrum and its Characteristics,	S and GIS onstrate G nd GIS design Electroma , Energy	S IS Ignetic Interac	Taxonomy Level II III IV V Energy, ction in the	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating		
CO CO1 CO2 CO3 CO4 Modu	Understa Interpret data and Compare Select an solution ile Conce Introd Elect Atmo	Cours and and summari and Apply varie GIS database m and examine da d verify RS and for various intere- repts and Found duction, Remarked sphere and wit	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing ote Sensing System, I ctrum and its Characteristics, h the Earth's Surface, Resol	Electroma , Energy	S IS IS Interaction S	Taxonomy Level II III IV V V Energy, ction in the te Sensing, cotallite and	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating		
CO CO1 CO2 CO3 CO4 Modu	Understa Interpret data and Compare Select an solution to Introd Elect Atmo Broad Senso	Cours and and summari and Apply vario GIS database m and examine da d Verify RS and for various intercent repts and Found duction, Reme romagnetic Spec- sphere and with d Classifications ors, Data Recent	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing ote Sensing System, I ctrum and its Characteristics, h the Earth's Surface, Resol of Sensors and Platform, Eart	Electroma , Energy l lution in th Observa	S IS IS IS Interac Remo ation S pote Se	Taxonomy         Level         II         III         IV         V         Energy,         ction in the         te Sensing,         Satellite and         ensing Data	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating		
CO CO1 CO2 CO3 CO4 Modu	Understa Interpret data and Compare Select an solution Ile Conc Introd Elect Atmo Broad Senso and T	Cours and and summari and Apply varie GIS database m and examine da d Verify RS and for various intere- tepts and Found duction, Remo- romagnetic Spea- pophere and wit d Classifications ors, Data Recept Data Products.	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing ote Sensing System, I ctrum and its Characteristics, h the Earth's Surface, Resol of Sensors and Platform, Eart ion, Transmission and Proces	Electroma , Energy I lution in th Observa	S IS IS IS Interac Remo ation S note Se	Taxonomy         Level         II         III         IV         V         Energy,         ction in the         te Sensing,         Satellite and         ensing Data	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating		
CO CO1 CO2 CO3 CO4 Modu	Understa Interpret data and Compare Select an solution i ile Conce Introd Electi Atmo Broad Senso and I	Cours and and summari and Apply varie GIS database m and examine da d verify RS and for various intere- epts and Found duction, Rema- romagnetic Spea- sphere and wit d Classifications ors, Data Recept Data Products.	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing ote Sensing System, I ctrum and its Characteristics, h the Earth's Surface, Resol of Sensors and Platform, Eart ion, Transmission and Processing	S and GIS onstrate Gind GIS design Electroma , Energy I lution in th Observa ssing, Rem	S IS IS Interact Remo ation S note Se	Taxonomy         Level         II         III         IV         V         Energy,         ction in the         te Sensing,         Satellite and         ensing Data	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating		
CO CO1 CO2 CO3 CO4 I	Understa Interpret data and Compare Select an solution Ile Conc Introd Elect Atmo Broad Senso and I Satel Interp	Cours and and summari and Apply varie GIS database m and examine da d Verify RS and for various intere- epts and Found duction, Reme romagnetic Spec- sphere and wit d Classifications ors, Data Recept Data Products. lite Image Inter- pretation Proceed	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS ar GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing ote Sensing System, I ctrum and its Characteristics, h the Earth's Surface, Resol of Sensors and Platform, Eart ion, Transmission and Processing lure and Elements, Interpret	S and GIS onstrate G nd GIS design Electroma , Energy lution in th Observa ssing, Rem	S IS IS IS Interac Remo ation S note Se ategies	Taxonomy         Level         II         III         IV         V         Energy,         ction in the         te Sensing,         satellite and         ensing Data         and keys,	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating		
CO CO1 CO2 CO3 CO4 I I II	Understa Interpret data and Compare Select an solution Ile Conce Introd Elect Atmo Broad Senso and I Satel Interp	Cours and and summari and Apply varie GIS database m and examine da d Verify RS and for various intere- epts and Found duction, Remo- romagnetic Spec- osphere and wit d Classifications ors, Data Recept Data Products. lite Image Inter- pretation Proceed al Image proces	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS an GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing ote Sensing System, I ctrum and its Characteristics, h the Earth's Surface, Resol of Sensors and Platform, Eart ion, Transmission and Processing hure and Elements, Interpret sing and Image Analysis step	S and GIS onstrate G nd GIS design Electroma , Energy I lution in th Observa ssing, Rem tation stra os, Image	S IS IS IS Interace Remo ation S note Se Rectif	Taxonomy         Level         II         III         IV         V         Energy,         ction in the         te Sensing,         Gatellite and         ensing Data         and keys,         cication and	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating         Hours         4         5		
CO CO1 CO2 CO3 CO4 I I II	Understa Interpret data and Compare Select an solution i Ile Conce Introd Electi Atmo Broad Senso and I Digit Resto	Cours and and summari and Apply varie GIS database m and examine da d verify RS and for various intere- epts and Found duction, Rema- romagnetic Spec- sphere and wit d Classifications ors, Data Recept Data Products. lite Image Inter- pretation Proceed al Image process oration, Image H	se Outcome Statement/s ze fundamental concepts in R ous satellite RS data and demo anagement system ata and data Products of RS ar GIS data and data products to disciplinary problems Module Contents lation of Remote Sensing ote Sensing System, I ctrum and its Characteristics, h the Earth's Surface, Resol of Sensors and Platform, Eart ion, Transmission and Processing lure and Elements, Interpret sing and Image Analysis step Enhancement, Spatial Filterir	S and GIS onstrate Gind GIS design Electroma , Energy I lution in th Observation stration stration tation stration strations, Image	S IS IS IS Interace Remo ation S note Se Rectifice Tran	Taxonomy         Level         II         III         IV         V         Energy,         ction in the         te Sensing,         satellite and         ensing Data         and keys,         fication and         sformation,	Taxonomy         Description         Understandin         g         Applying         Analysing         Evaluating         Hours         4         5		

	Applications of 1	Remote Sensing				
III	Land use Land (	Cover Mapping,	Crop Inventor	ry, Ground Wate	er Mapping,	5
	Urban Growth,	Flood Plain Ma <sub>l</sub>	oping, Disaste	r Management.		
	GIS – An Overv	iew				
IV	Introduction, Ge	ographical conce	pts and Term	inology, Differen	nce between	4
1 4	Image Processin	g system and GI	S, Various GI	S packages and	their salient	
	features, Essentia	ls components of	GIS, Utility of	GIS, GPS		
	GIS Data				· .	
V	GIS Data types and CIS Data Restor	nd Data Represen	tation, Data Ac	quisition, Georef	erencing of	5
	Data in GIS GIS					
	GIS Spatial Data	Analysis and A	nnlications	ment System		
	Measurements in	GIS-Lengths. Per	rimeters, and A	reas. Oueries.		
VI	Reclassification, Buffering and Neighborhood Functions, Map Overlay, Spatial					
	Interpolation, An	alysis of Surfaces	, Network Ana	lysis, GIS Applic	ations	
	·	-				
			Textbooks			
1	Chandra, A.M.	and Gosh, S.K.,	"Remote Sens	sing and GIS", N	Varosa Publis	shing House.
1	2008					
2	Lo, C.P. and Yo	oung, A.K.W., "	Concepts and	Techniques of	Geographica	l Information
2	System", Prenti	ce Hall India. 20	0012			
			References		•	
1	Lillesand, T.M.	and Kieffer, "R	emote Sensing	g and Image Inte	erpretation",	John Wiley
	and Sons, 6th E	dition. 2012				
2	Chang, K, "Intro	oduction to Geo	graphical Syst	ems", Tata McO	Graw-Hill, 4t	h Edition.
	2010					
			Useful Links			
	NPTEL: <u>https://</u>	nptel.ac.in/noc/	courses/noc19	<u>/SEM1/noc19-c</u>	<u>e08</u>	
2	https://nptel.ac.i	<u>n/noc/courses/n</u>	<u>oc18/SEM1/n</u>	<u>oc18-ce10</u>		
			O-PO Mappin	lg haarmaa (DO)		
	1	2 2			5	6
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			2			
C02	2		<u>∠</u>	2		
$-\frac{003}{004}$	2					
The stren	j J ath of manning is to	he written og 1.	I ow 2. Madin	$2$ $ $ $2$ $ $ $2$ $2$ $2$ $2$ $2$ $2$ $2$ $2$ $2$ $2$		<u>∠</u>
Fach CO	gin of mapping is to	b be written as 1:	a DO	in, 5: mign		
Each CO	of the course must	map to at least on	e ru.			

	Walchand College of Engineering, Sangli								
		(Obvern	AY 2024-25	( Institute)					
			Course Information	1					
Program	me	M.Tech. (Comp	uter Science and Engin	neering)					
Class, Ser	nester	First Year M. Te	ech., Sem II						
Course C	ode	7CO535							
Course N	ame	PE4: Deep Lear	ning						
Desired R	Requisites:	Linear Algebra,	Statistics and Probabi	lity Theory, Machine Lea	rning				
Teaching	eaching Scheme (Marks)								
Lecture	3	MSE	MSE ISE ESE						
	Hrs/week		-0						
Tutorial	-	30	20	50	100				
			Cre	edits: 3					
			<b>Course Objectives</b>						
1	To emphas	sise significance o	f deep learning in AI.						
2	To educate	e participants on u	se of deep learning arc	chitectures for real life sce	enarios.				
3 To infuse skills required to optimize performance of deep learning architectures.									
4	4 To enable participants to choose appropriate deep learning techniques to solve real life								
	problems.	Carrie Ortage		Tawaya mu Laval					
At the end	l of the cour	course Outcom	ill be able to	s raxonomy Lever					
At the end		se, me students w			Bloom's				
СО	C	ourse Outcome S	Statement/s	Bloom's Taxonomy Level	Taxonomy Description				
CO1	grasp fun foundation	damentals of do to the damentals of do to the damentals of mathematics.	eep learning using	П	Understanding				
CO2	use suitabl	e deep learning ar	chitecture for a given	Ш	Applying				
	problem.	-	-	111	Apprying				
CO3	examine architectur and hyperp	performance of re using proper poarameter tuning t	of deep learning performance metrics echniques.	IV	Analysing				
CO4	recommen architectur measures given prob	d appropriate re, performan and regularizatio lem scenario.	deep learning ce improvement on techniques for a	V	Evaluating				
Module			Module Contents		Hours				
Ι	Introduction Neural net Activation layer Netwo	ion twork fundament functions, Percep yorks, Deep L arch	als: General Introduc ptron algorithm, Back nitectures.	tion to Deep Learning, propagation and Multi-	6				
II	Hyperpar	ameter tuning ar	nd optimization		8				

	Bias Adan Multi	Bias - variance, Regularization technioques, Optimizers – GD, SGD, Adam, RMSProp, Hyperparameter tuning, Batch normalization, Multiclass-classification						
	Conv	oluti	onal Neural Net	works (CNN)				
Ш	Unde Matri Types conne Mini	Understanding Convolutions: Convolutions versus cross-correlation, "Big Matrix" and "Tiny Matrix" analogy, kernels, CNN Building blocks: Layer Types, convolutional layers, activation layers, Pooling Layers, Fully- connected Layers, Batch Normalization, Dropout, ShallowNet, LeNet, MiniVGGNET						
IV	Deep Funda detec	Deep learning-based object detectionFundamentals of Object detection, Family of R-CNN, Single shot6detectors (SSD), You only look once (YOLO)						
V	Seque Introc tradit archit mode LSTM	ence f ductio ional tecture ls, Bie	models on to RNN, Applic NN for seque e types, how to b directional RNN,	cations of sequence models/RNN, D nce data, Backpropagation in to puild language model, Basic tasks Deep RNN, vanishing gradient pro	Drawback of time, RNN of language blem. GRU,	6		
VI	LSTM       Advanced sequence models and auto encoders         Word embedding, Encoder - Decoder (seq2seq) model, Attention       mechanism, Transformers, Introduction to Auto encoder, Denoising auto         encoder, Sparse auto encoder, Variational auto encoder, state-of-the-art       5         case studies/architectures       5							
				Textbooks				
1	Ian G	loodfe	ellow, Yoshua Be	ngio and Aaron Courville Deep Le	arning, MIT	Press, 2016		
2	Aure O'RE	lien EILLY	Geron, "Hands- 7, Dec 2017	On Machine Learning with Sc	ikit-Learn &	TensorFlow",		
				References				
1	Neura	al Net	works: A System	<b>References</b> atic Introduction, Raúl Rojas, 1996	5			
1 2	Neura Patter	al Net rn Rec	works: A System cognition and Ma	<b>References</b> atic Introduction, Raúl Rojas, 1996 chine Learning, Christopher Bisho	5 p, 2007			
1 2	Neura Patter	al Net rn Rec	works: A System cognition and Ma	<b>References</b> atic Introduction, Raúl Rojas, 1996 chine Learning, Christopher Bisho	5 p, 2007			
1 2	Neura Patter	al Net rn Rec	works: A System cognition and Ma	References atic Introduction, Raúl Rojas, 1996 chine Learning, Christopher Bisho Useful Links	5 p, 2007			
1 2 1	Neura Patter	al Net rn Rec //npte	works: A System cognition and Ma el.ac.in/courses/10	References atic Introduction, Raúl Rojas, 1996 chine Learning, Christopher Bisho Useful Links 06/106/106106184/	5 p, 2007			
1 2 1 2 1 2	Neura Patter <u>https:</u>	al Net rn Rec //npte	works: A System cognition and Ma el.ac.in/courses/10 w.coursera.org/sp	References atic Introduction, Raúl Rojas, 1996 chine Learning, Christopher Bisho Useful Links 06/106/106106184/ pecializations/deep-learning	5 p, 2007			
1 2 1 2 3	Neura Patter <u>https:</u> Trans	al Net rn Rec //npte ://www sformedia	works: A System cognition and Ma el.ac.in/courses/10 w.coursera.org/sp er: https://huggin	References         atic Introduction, Raúl Rojas, 1996         chine Learning, Christopher Bisho         Useful Links         D6/106/106106184/         becializations/deep-learning         gface.co/course/chapter1/1?fw=pt	5 p, 2007			
1 2 1 2 3	Neura Patter <u>https:</u> <u>https:</u> Trans	al Net rn Rec //npte ://ww sforme	works: A System cognition and Ma el.ac.in/courses/10 w.coursera.org/sp er: https://huggin	References natic Introduction, Raúl Rojas, 1996 chine Learning, Christopher Bisho Useful Links 06/106/106106184/ pecializations/deep-learning gface.co/course/chapter1/1?fw=pt	5 p, 2007			
1 2 1 2 3	Neura Patter	al Net rn Rec //npte ://www sforme	works: A System cognition and Ma el.ac.in/courses/10 w.coursera.org/sp er: https://huggin	References         atic Introduction, Raúl Rojas, 1996         chine Learning, Christopher Bishor         Useful Links         06/106/106106184/         pecializations/deep-learning         gface.co/course/chapter1/1?fw=pt         CO-PO Mapping	5 p, 2007			
1 2 1 2 3	Neura Patter	al Net rn Rec //npte ://ww sformo	works: A System cognition and Ma el.ac.in/courses/10 w.coursera.org/sp er: https://huggin	References         atic Introduction, Raúl Rojas, 1996         chine Learning, Christopher Bishor         Useful Links         06/106/106106184/         becializations/deep-learning         gface.co/course/chapter1/1?fw=pt         CO-PO Mapping         Programme Outcomes (PO)	5 p, 2007			
1 2 1 2 3	Neura       Patter       https:       https:       Trans       1	al Net rn Rec //npte ://www sformo	works: A System cognition and Ma el.ac.in/courses/10 w.coursera.org/sp er: https://huggin	References         atic Introduction, Raúl Rojas, 1996         chine Learning, Christopher Bisho         Useful Links         06/106/106106184/         becializations/deep-learning         gface.co/course/chapter1/1?fw=pt         CO-PO Mapping         Programme Outcomes (PO)         4       4	5 p, 2007 5	6		
1 2 1 2 3 3	Neura         Patter         https:         https:         Trans         1         1	al Net rn Rec //npte ://www sformo	works: A System cognition and Ma el.ac.in/courses/10 w.coursera.org/sp er: https://huggin 3 1	References         natic Introduction, Raúl Rojas, 1996         chine Learning, Christopher Bisho         Useful Links         D6/106/106106184/         Decializations/deep-learning         gface.co/course/chapter1/1?fw=pt         CO-PO Mapping         Programme Outcomes (PO)         4       1	5 p, 2007	6 2		

CO3	1	1	2	2		3	
CO4			1	1		3	
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.							

	Wal	chand College of Engine (Government Aided Autonomo	neering, Sa	ngli	
		AY 2024-25			
		Course Informati	on		
Program	me	M.Tech. (Computer Science	and Engineerin	ng)	
Class, Se	mester	First Year M. Tech., Sem II		<u> </u>	
Course C	Code	7CO536			
Course N					
Desired I	Requisites:	Fundamentals of security			
	1	<u> </u>			
Tea	ching Scheme	Examin	nation Scheme	(Marks)	
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
			Credits: 03	I	
		Course Objective	es		
1	Identify various typ	es of cyber threats, including r	nalware, hackii	ng, and socia	l engineering.
2	Examine and imple	ment network security protoco	ls such as IPsec	z, SSL/TLS,	and VPNs.
3	Develop a comprehe	ensive understanding of incide	nt response pla	nning and m	ethodologies.
	Course	e Outcomes (CO) with Bloon	n's Taxonomy	Level	
At the end	d of the course, the stu	udents will be able to,			
со	Co	urse Outcome Statement/s		Bloom's Taxono	Bloom's Taxonomy
	Summerize the con	conta of information acquity	and the CIA	my Level	<b>Description</b>
	triad.	cepts of mormation security		II	Understanding
CO2	Apply network secu against common vul	urity measures to mitigate risl Inerabilities	ks and protect	III	Applying
CO3	Analyze and catego appropriate solution	rize common web vulnerabilit	ies, proposing	IV	Analysing
CO4	Evaluate the secu environments and id	rity considerations of clou dentify potential risks.	d computing	V	Evaluating
Module		Module Contents			Hours
	Module 1: Introdu	ction to Cyber Security Overv	iew of cyber se	curity	
I	importance, chal confidentiality, in malware, hacking,	lenges, and threats Inform tegrity, availability (CIA triad social engineering	ation security 1) Types of cy	concepts: ber threats:	08
П	Module 2: Network Network vulnera SSL/TLS, VPNs Secure communic.	k Security and Cryptography bilities and attacks Network Cryptography basics: encryp ation and data protection techr	security protoc tion, decryptic	cols: IPsec, on, hashing	09

	Modulo 2. W	oh and Applicat	ion Socurity			
	Would 5. W	eb and Applicat	ion security			
тт	Common we	b vulnerabilitie	s: SQL injec	tion, XSS, CSRF S	Secure	00
	coding pract	ices and applie	cation securit	y testing Securing	web	08
	applications:	input validation	, output encod	ling		
		1	· 1			
	Module 4: Inci	dent Response an	nd Threat Intell	igence		
<b>T</b> 7	Incident man			Thurst intalling an an		07
10	foods and anot	nse planning and	methodologies	Inreat intelligence so	ources,	07
	recovery	ysis Hallullig sec	surity incluents	. mvestigation, contair	innent,	
	Module 5: Clo	ud and IoT Secur	itv			
			ity			
V	Cloud security	considerations:	data privacy, co	ompliance Securing Io	T T	06
v	devices and co	devices and communication Identity and Access Management (IAM) in				
	the cloud					
	Modulo 6: Et	nicol Hooling o	nd Danatration	Tasting		
	Module 6: El	incal Hacking a	nd Penetration	riesting		
VI	Introduction	to othical has	king goola	and local consider	ationa	07
V I	Denotration to	ating mathedal	killig. goals	and legal consideration and legal consideration	ations	07
	and risk asses	sment	Sgles and tools	s Reporting vulnerab	mues	
		Sment	Taythooks			
			TEXTOORS			
1	"Principles of	Computer Sec	urity: CompT	IA Security+ and Be	evond"	hy Wm Arthur
	Conklin Gree	ory White Dw	avne William	s Chuck Cothren R	oger I	Davis
	"Cybersecurit	$v \Delta Business$	Solution" by R	oh Arnold		
2	Cyberseeun					
	1		References			
1						
	"Hacking: Th	e Art of Exploit	tation" by Jon	Erickson		
2	"Cybersecurit	y and Cyberwa	r: What Ever	yone Needs to Know	w" by F	P.W. Singer and
2	Allan Friedm	an				
			Useful Links	3		
1	NPTEL			, 		
	1					
			CO-PO Mappi	ing		
			Programme C	Outcomes (PO)		
	1	2	3	4	5	6
CO1			2			
CO2			2			
CO3	2			2		
CO4	3			2		
The strengt	th of mapping is	to be written as 1	: Low, 2: Medi	um, 3: High		
Each CO o	f the course mus	t map to at least of	one PO.			

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
			AY 2024-25						
			Course Informat	ion					
Progra	amme		M.Tech. (Computer Science	e and Eng	gineerii	ng)			
Class,	Semester		First Year M. Tech., Sem	II					
Cours	e Code		7CO537						
Cours	e Name		Advanced Database Manag	gement Sy	stem				
Desired Requisites: Database System									
	Teaching SchemeExamination Scheme (Marks)								
Lectu	re	3 Hrs/week MSE ISE ESE				Total			
Tutor	ial	-	30	20		50	100		
				Cred	its: 3				
			~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~						
		1.0.1.1	Course Objectiv	es					
1	Understa	ind fundamental	database concepts and basic	operation	s.				
2	Utilize S	QL for complex	queries and optimize databa	ise perform	$\frac{\text{nance.}}{\cdot}$				
3	Design a	nd implement d	atabase systems based on spe	ecific requ	iremer	its.			
4	Design a	nd implement d	atabase systems based on spe	ecific requ	iremer	its.			
At the	and of the	<u>Course</u>	Outcomes (CO) with Bloom	n's Taxor	iomy I	Level			
At the		course, me stud	ients will be able to,			Bloom's	Bloom's		
СО		Cours	se Outcome Statement/s			Taxonomy	Taxonomy		
						Level	Description		
CO1	Understa	nd various datal	base systems and their design	n issues.		П	Understandin		
CO2	Design a	nd implement a	database for a specified dom	ain follov	ving	III	Applying		
CO3	Formula	te data retrieval	queries in SOL and abstract	auerv			Creating		
	language	es.	queries in SQL and abstract	query		V	Creating		
CO4	Formula	te data retrieval	queries in SQL and abstract	query		TTT	Applying		
	language	es.	-			111			
Modu	ıle		Module Contents				Hours		
I	Form corre	al review of the ctness	relational database and FI	Os Implic	cation,	Closure, its	6		
II	3NF Basic	and BCNF, Dec	composition and synthesis ap essing, external sorting, file s	oproaches, scans	Revie	w of SQL99,	6		
III	Proce rules serial	essing of joins, n DB transactio isability	naterialized vs. pipelined pro ns, ACID properties, interl	eaved exe	uery trecution	ansformation s, schedules,	7		
IV	Corre dead	ectness of interle locks, multiple le	eaved execution, Locking an evel granularity, CC on B+ t	d manage rees, Optin	ment o mistic (	of locks, 2PL, CC	7		
V	T/O dynar relati	based technique mic databases, onal databases	s, Multiversion approaches, Failure classification, reco	Comparis overy alg	on of orithm	CC methods, , XML and	6		

VI	Advanced topics: Database Security, Distributed databases design, ObjectOriented database design & its implementation, Introduction to recent advancesin database technology.							
			Tortheoleg					
I extDooks								
1	R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw Hill, 2004							
2	A. Silberschatz, H	H. Korth, S. Sud	larshan, Databas	e system concepts	s, 5/e, McGraw	/ Hill, 2008		
			References					
1	R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw Hill, 2004							
2	A. Silberschatz, H. Korth, S. Sudarshan, Database system concepts, 5/e, McGraw Hill, 2008							
	·							
	1		Useful Links					
1	https://www.cse.i	itb.ac.in/infolab	/Data/Courses/C	CS632/				
			CO-PO Mappir	ng				
		]	Programme Ou	tcomes (PO)				
	1	2	3	4	5	6		
CO1	2			2				
CO2	2				2			
CO3		2				2		
<b>CO4</b>	2		3					
The streng	gth of mapping is to	be written as 1	: Low, 2: Mediu	m, 3: High				
Each CO	of the course must	map to at least o	one PO.					

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)						
			AY 20	24-25			
			Course Inf	formation			
Progr	amm	ne	M.Tech. (Compu	ter Science and Eng	gineering)		
Class,	Sem	ester	First Year M. Te	ech., Sem II			
Cours	se Co	de					
Course Name Machine Learning in practice							
<b>Desired Requisites:</b> Basic mathematics and python programming							
	Teac	ching Scheme		Examination Scho	eme (Marks)		
Lectu	re	Hrs/week	MSE	ISE	ESE	Total	
Tutor	ial	3	30	20	50	100	
				Credits	: 3		
			Course O	bjectives			
1	To	introduce python an	d mathematical conc	cepts required for m	achine learning	g	
2	To	prepare data for mad	chine learning	1 1 1 1			
3	10	Implement supervise	ed and unsupervised	learning algorithm			
At the	and	<u>Course</u> the stu	Jutcomes (CO) with idents will be able to	n Bloom's Taxonor	ny Level		
At the		of the course, the sti		),	Bloom's	Bloom's	
СО		Course	Outcome Statemer	nt/s	Taxonomy Level	Taxonomy Description	
C01	unc Lea	lerstand fundamenta arning	ls of python libraries	s used for Machine	II	Understanding	
CO2	apr dat	bly different data participation data participation.	re-processing techni	iques required for	III	Appling	
CO3	ide to s	ntify and implement solve real life proble	different machine le ms.	earning algorithms	IV	Analyzing	
CO4	eva alg	aluate and compare orithms.	performance of the	machine learning	V	Evaluating	
Modu	ıle		Module Con	ntents		Hours	
I		<b>Introduction to Ma</b> Introduction, Type Learning, Python b Matplotlib for data	achine Learning: es of machine lear basics: basic constru visualization	ning, Applications acts of python, pan	of Machine das, NumPy,	6	
п		Data pre-processin Data Cleaning: ha handling categorica normalization, Train	ng: ndling missing valu al features, Feature a/test split, cross-val	ues, removing nois e selection and red idation	e from data, luction, Data	6	
III		Supervised Learni Linear regression, r Naïve Bayes classif	<b>ng-I</b> : nultiple regression, l ier, Decision tree cla	MSE, RMSE Classif assifier, KNN, logist	fication using	8	

	Supervised Learning-II	
W	Ensemble models: tree-based algorithms, Bagging, Boosting, Stacking.	8
1 V	Model Performance: Confusion matrices, accuracy, precision, recall,	0
	F1 score, Hyper parameter tuning, deployment	
	Unsupervised Learning:	_
V	Clustering- K means clustering, HDBSCAN, Dimensionality reduction	5
	using PCA.	
	Reinforcement learning and Case study	
VI	Introduction to reinforcement learning, Types, elements and applications	6
V I	of Reinforcement learning, Case studies based on various applications of	0
	machine learning algorithms in real life.	
	Textbooks	
1	Machine Learning. Tom Mitchell. First Edition, McGraw-Hill, 1997.	
	References	
1	Introduction to Machine Learning Edition 2, by Ethem Alpaydin.	
	Useful Links	
1	https://www.geeksforgeeks.org/machine-learning/	
2	https://swayam.gov.in/nc_details/NPTEL	

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
<b>CO1</b>			1	1			
CO2			2	2	3		
CO3			2	2	3		
CO4			2	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, and preferably to only one PO.

# Assessment