An Autonomous Institute Affiliated to RTM Nagpur University

Scheme of Examination and Syllabus

Scheme of Examination for First Year M. Tech. Programme in Computer Science & Engineering

Semester - I

							Contact	-		E	xam Schem	e	
Sr. No.	Course Category	Course Code	Course Title	L	T	P	Hrs / week	Credits	CT - 1	CT - 2	TA / CA	ESE	TOTAL
\vdash		MCS1101	Advances in Algorithms	4	-	-	4	4	15	15	10	60	100
1.	PCC	111001111	Data Science	3	-	_	3	3	15	15	10	60	100
2.	PCC	111001102	Artificial Intelligence & Intelligent				3	3	15	15	10	60	100
3.	PCC	MCGIIO3	Systems	3	•	-	J	3					
4.	PCC		Advances in Algorithms Lab	-	-	2	2	1	-	-	25	25	50
5.	PCC	MCS1105	Data Science Lab	-	-	2	2 ,	1	-	-	25	25	50
			Professional Elective - I	3	-	-	3	3	15	15	10	60	100
6.	PEC	WICDITIO O	Professional Elective - II	3	_	-	3	3	15	15	10	60	100
7.	PEC	IVICBITO) II		3								_	_
8.	MCC	MAU1101	Audit Course – I (Pedagogy Studies)	2	-	-	2	Audit	-	-	-		
			Total	18	1	4	22	18	75	75	100	350	600

L- Lecture T-Tutorial P-Practical CT1- Class Test 1 CT2- Class Test 2 TA/CA- Teacher Assessment / Continuous Assessment ESE-End Semester Examination (For Laboratory: End Semester Performance)

*- Professional Elective / Audit Course / Open Elective (list is provided at the end of structure)

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Deptt. (CSE)
Tulsiramii Gaikwad-Patil College

of Engineering & Technology
Mobadaon, Wardha Road, Negpur

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Tulsiramji Gaikwad-Patil
College Of Engineerin

College Of Engineering and Technology, Nagpur

Vice Principal

Tulstramji Gaikwad-Patil

College Of Engineering & Technology, Nagpur.

Principal

Tulsiramji Galkwad Patil College Or Engineering and Technology, Nagpur



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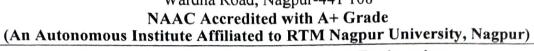
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	Pr	ogram:	M. Tech. Comput	ter Science & E		
Semester-I			ces in Algorithms			
	hing Scheme				Examinat	tion Scheme
Theory		eek	CT-			15 Marks
Tutoria					CT-II	15 Marks
Total Cred					CA	10 Marks
	of ESE: 3Hrs				ESE	60 Marks
	sites: Data Stru	icture &	Algorithms		Total Marks	100 Marks
			Course C			
Unit I	The Greedy Marking	lethod,	tals: Basic Concept Divide and Conquer	r, Dynamic Prog	gramming, Branc	h and bound, Back
Hash Tables and Search Trees: Direct address tables, hash tables, hash functions, open addressing, perfect hashing and Randomly built binary Search Trees, Red-Black Trees Advanced data structures- Fibonacci heaps, augmented data structures, van Emdc Boas tree Graphs: The Graph abstract data Type, Data Structures for Graphs, Graph Traversal, Directed Graphs. Graph algorithms: all-pairs shortest paths.						
Unit III	Network Flow and Matching: Flows and Cuts, Maximum Flow, Maximum Bipartite Matching, Minimum Cost Flow Strings and Pattern Matching algorithms The Rabin Karp Algorithm, Knuth-Morris-Pratt algorithm					
Unit IV	Number Theory and Cryptography: Fundamental Algorithms involving numbers, Cryptographic Computations, Information Security Algorithms and Protocols. Linear programming: Standard and slack forms, The simplex algorithm Parallel Algorithm: Performance Measures of Parallel Algorithms, Parallel Merging/Sorting Algorithms on CREW/EREW, Parallel searching algorithms.					
Unit V	Dealing with intractability: NP-Completeness, Approximation algorithms:-Vertex cover problem, The travelling Salesman problem, Set covering problem Randomized algorithms Las Vegas and Monte Carlo.					
Text Boo	ks				- 1711 PIT	2002
T.1	Cormen, Liese	rson, R	ivest, "Introduction 1	to Algorithms",	2nd Edition, PHI	, 2003
T.2	E Horrowitz, S salmi, S Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, University Press, 2007					
Reference	e Books			·	· - C A	Lanithma" Danger
R.1	Aho, A V Ho Education, 20	pcraft U 007	Jllman JD, "The De	esign and analys	sis of computer A	Algorithms", Pearson
Useful L	inks			(0)		
1			nptel.ac.in/noc21_c	s68/preview		
2	https://nptel.a	ac.in/				

	Course Outcomes	CL	Class Sessions
MCS1101.1	Analysis algorithm using asymptotic notations	4	9
MCS1101.2	Apply Fundamental techniques and Dynamic Programming	3	9
MCS1101.3	Distinguish weighted graph and understand network flow	4	9
MCS1101.4	Analyze text processing, Number theory and Cryptography	4	9
MCS1101.5	Evaluate linear programming and randomized algorithms	5	9



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Program: M. Tech Computer Science Engineering

Semester-I	M	CS1102 : Data	Science			
		Scheme		Examina	tion Scheme	
Theory		3 Hrs/week		CT-I	15 Marks	
Tutoria		-		CT-II	15 Marks	
Total Cred	lits	3		CA	10 Marks	
Duration o	fES	E: 3Hrs		ESE	60 Marks	
Pre-Requi	sites	: Database Cond	cept and python	Total Marks	100 Marks	
			Course Contents			
Unit I Introduction to Data Science: Evolution of Data Science, history.— Data Science Roles— Stages in a Data Science Project—Applications of Data Science in various fields—Data Security Issues Data Wrangling Combining and Merging Data Sets—Reshaping and Pivoting—Data Transformation—String manipulations—Regular Expressions.						
Unit II	Machine Learning: Supervised Learning: : Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes Linear models: Linear Regression, Logistic Regression, Generalized Linear Models Support Vector Machines, Nonlinearity and Kernel Method Unsupervised Learning: Clustering: Kernel density estimation, k-means, Naive Bayes, Data and Data Scraping, Classification, Ranking, Dimensionality Reduction: PCA and kernel PCA Reinforcement Learning - Markov models - Large Scale Machine Learning - Applications.					
Unit III	Advance Algorithm and Structure: Algorithm Analysis - Methodologies for Analyzing Algorithms, Asymptotic Notation, A Quick Mathematical Review, Amortization, Experimentation. Data Structures - Stacks and Queues, Vectors, Lists, and Sequences, Trees, Priority, Queues and Heaps, Dictionaries and Hash Tables. Search Trees and Skip Lists - Ordered Dictionaries and Binary Search Trees, AVL Trees. Bounded-Depth Search Trees, Splay Trees, Skip Lists. Sorting, Sets, and Selection - Merge-Sort, Abstract Data Type, Quick Sort, A Lower Bound on Comparison-Based Sorting, Bucket-Sort n Comparison of Sorting Algorithms. Optimization Gradient descent methods; Constrained optimization, KKT conditions; Introduction to non-gradient techniques; Introduction to least squares optimization					
Unit IV	Data Mining: Introduction to Data Mining, Techniques, Data mining algorithms: Association rules, Classification, Prediction, Advanced techniques, Data Mining software and applications Information Retrieval Technique: Retrieval Process – Architecture - Boolean					
Unit V	B	ig Data Security Data Privacy is s	: Big data Privacy— Reidentification elf-regulating— Ownership —Big Data Design: Kerberos — Default Hadoop Moo	Security – Orga	nizational Security	

Text Boo	KS 2.1 OPIcil and Pachel Schutt				
T.1	O'Reilly, 2014				
T.2	"Mining of Massive Datasets",: Anand Rajaraman and Jeff Ullman				
Referen	no Pooles				
Referen	CE BOOKS 1. Data Science": Jojo Moolavil, PACKT.				
R.1	"Smarter Decisions: The Intersection of IoT and Data Science",: Jojo Moolayil, PACKT,				
10.1	2016				
R.2	"Data Mining: Concepts and Techniques",: Jiawei Han, Micheline Kamber and Jian Pei. Third				
K.2	Edition, ISBN 0123814790, 2011.				
R.3	"Learning Python, Latest Edition": Mark Lutz., , O'REILLY Media, Inc., 2009.				
Useful	Links				
1	https://onlinecourses.nptel.ac.in/noc21_cs69/preview				
2	https://nptel.ac.in/courses/106/106106179/				

	Course Outcomes	CL	Class Sessions
MCS1102.1	Analyze Data Science w.r.t. history and data wrangle	4	9
MCS1102.2	Apply the concept of Machine Learning	3	9
MCS1102.3	Analyze advance algorithm and data structure	4	9
MCS1102.4	Build Information Retrieval Technique and understand searching web technique	6	9
MCS1102.5	Analyze big data security	5	9

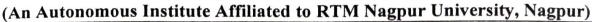
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Program: M. Tech. Computer Science & Engineering

Semester			ficial Intelligence & Intelligent Syst	ems	
Tea	ching	Scheme		Examinat	ion Scheme
Theory 3 H		3 Hrs/week		CT-I	15 Marks
Tutorial -		-		CT-II	15 Marks
Total Cr	edits	3		CA	10 Marks
Duration	of ES	E: 3Hrs		ESE	60 Marks
		: Ability to undetatistics and mo	erstand complex algorithms, Basic deling	Total Marks	100 Marks
			Course Contents		
Unit I Introduction to Artificial Intelligence: Overview of AI problems, AI problems as NP, N Complete and NP Hard problems. Strong and weak, neat and scruffy, symbolic and su symbolic, knowledgebased and data-driven AI.					
Unit II	Search Strategies: Problem spaces: states, goals and operators, problem solving by search,				
Unit III	Knowledge representation and reasoning: Propositional and predicate logic, Resolution and				
Unit IV	Al Learning Models: Single Agent Learning, Multi Agent Learning, Knowledge-Based Classification, Feedback-Based Classification. Natural Language Processing: Language models, n-grams, Vector space models, Bag of words, Text classification. Information retrieval.				
Unit V	Intelligent Systems Key Application Areas: Expert system, decision support systems, Speech and vision, Natural language processing, Information Retrieval, Semantic Web.				
Text Boo	ks				
T.1	Artifi Hill.	cial Intelligence	by Elaine Rich, Kevin Knight and S	hivashankar B N	air, Tata McGraw
T.2	Artifi	cial Intelligence	: A Modern Approach by S. Russell a	nd P. Norvig, Pre	ntice Hall
T.3			and Intelligent Systems by N.P. Padh		
			•		•

Reference Books					
R.1	Introduction to Artificial Intelligence and Expert Systems by Dan W. Patterson, Pearson Education.				
R.2	Intelligent Systems for Engineers and Scientists, 3rd Edition by Adrian A. Hopgood CRC Press				
Useful L	Useful Links				
1	https://nptel.ac.in/courses/106/105/106105077/				
2	https://nptel.ac.in/courses/106/102/106102220/				
3	https://nptel.ac.in/courses/106/106/106106202/				

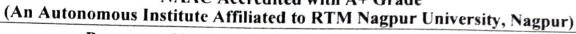
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	Course Outcomes	CL	Class Sessions
MCS1103.1	Apply AI techniques to solve different problems.	3	9
MCS1103.2	Choose problem solving methods to solve a specific problem and provide the best result.	5	9
MCS1103.3	Estimate formal methods of knowledge representation, logic and reasoning	5	9
MCS1103.4	Demonstrate proficiency in applying scientific methodology for various AI Learning models	4	9
MCS1103.5	Develop intelligent systems to solve practical problems.	6	9



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Semester-I	MCS1104	· Advance	· i	A 1	41 I . L			

Scheme 2 Hrs/week 1 E: 2Hrs Basic knowledgement the code i	ge of Data structure Course Contents	Examination Internal External Total Marks	25 Marks 25 Marks 26 Marks					
Scheme 2 Hrs/week 1 E: 2Hrs Basic knowledgement the code i	ge of Data structure Course Contents	Internal External	25 Marks 25 Marks					
1 E: 2Hrs Basic knowledgement the code i	Course Contents	Internal External	25 Marks 25 Marks					
Basic knowledgement the code i	Course Contents		25 Marks					
Basic knowledgement the code i	Course Contents	Total Marks	50 Marks					
ement the code i	Course Contents	Total Marks	50 Marks					
ement the code i	Course Contents							
	C1 C II 1: 45							
	n Clanguage for Hashing and B	Implement the code in C language for Hashing and Building dynamic Algorithm						
ment the code i	Implement the code in C for the Rabin Karp Algorithm							
ement the code i	n C for Knuth-Morris-Pratt algor	rithm						
ment the code i	n C++ for Las Vegas algorithm							
8 Measures Performance of Parallel Algorithms								
T.1 Cormen, Lieserson, Rivest, "Introduction to Algorithms", 2nd Edition, PHI, 2003								
E Horrowitz, S salmi, S Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, University Press, 2007								
	ement the code is ement the code is ement the code is ement the code is ures Performance on, Lieserson, Ri-	ement the code in C language for The travelling ament the code in C++ for Las Vegas algorithm ement the code in C++ for Monte Carlo algorithm ement the code in C++ for Cryptographic algorithm ement the code in C++ for Cryptographic algorithm experience of Parallel Algorithms on, Lieserson, Rivest, "Introduction to Algorithm owitz, S salmi, S Rajasekaran, "Fundamentals of University Press, 2007	ment the code in C++ for Monte Carlo algorithm ment the code in C++ for Cryptographic algorithm ures Performance of Parallel Algorithms n, Lieserson, Rivest, "Introduction to Algorithms", 2nd Edition, PHI, 200 owitz, S salmi, S Rajasekaran, "Fundamentals of Computer Algorithms", University Press, 2007					

R.1	Aho, A V Hopcraft Ullman JD, "The Design and analysis of computer Algorithms", Pearson Education, 2007
R.2	Hari Mohan Pandy, "Design analysis amd Algorithms". University Science Press, 2009

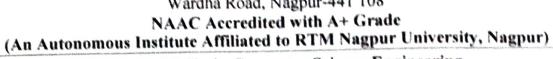
Iseful Links

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1	https://onlinecourses.nptel.ac.in/noc21_cs68/preview
2	https://nptel.ac.in/courses/106/104/106104019/

	Course Outcomes	CL	Class Sessions
MCS1104.1	Analysis algorithm using asymptotic notations	4	9
MCS1104.2	Apply Fundamental techniques and Dynamic Programming	3	9
MCS1104.3	Distinguish weighted graph and understand network flow	4	9
MCS1104.4	Analyze text processing, Number theory and Cryptography	4	9
MCS1104.5	Evaluate linear programming and randomized algorithms	5	9



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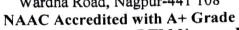
Program: M. Tech. Computer Science Engineering

Semester-I	M	CS1105 : Data	Science Lab		annothing administrative production of the control		
Teac	hing	g Scheme Examination Scheme			AND THE RESERVE OF THE PROPERTY OF THE PROPERT		
Practica	1	2 Hrs/week		Internal	CONTRACTOR OF THE PROPERTY OF		
Total Cred	medical and market color set	1		External 25 Marks			
Duration o	f ES	E: 2Hrs					
Pre-Requi	sites	: Basic knowled	ge of Big data analytics.	Total Marks	50 Marks		
and the second s			Course Contents				
1	Imp	lement a Progra	m for checking whether the given nu	imber is an even number	er or not.		
	Imp	lement Program	to demonstrate list and tuple in pyth	hon. Write a program t	ising a for loop		
2	that	loops over a sec	quence		operation and a set for the security of the se		
,	Imp	lement a pythor	n program to count the numbers of c	characters in the string	and store them		
3		dictionary					
4	Imp	lement Python	program to multiply matrices		ti sec <u>u</u> laforina dan se ista hasilakaharan se secara se seb laharan seda da sebesa se		
5	Design a python program to find the most frequent words in a text file						
6	Implement a Python Program to perform Binary Search and linear search						
7	Imp	olement a pythor	n program for selection sort. b) Desig	gn a python program fo	or Insertion sort		
8	lmp	olement linear re	egression using python				
Text Boo	ks						
T.1	prob	lemsolving foci	Introduction to computer science us us", Wiley Publishers, 2013		ationai		
T.2	Mar	k Lutz ,"Learni	ng Python, Latest Edition",O'REILL	Y Media, Inc., 2009.	on the Colonial Personal Symbols (1975) and the propriation of the Symbols (1984) and 1974 are 1974.		
Referenc	e Bo	oks			ompasi kandi COMA-mutungan selitangan pepanang diakangan Johan Sakan Sakan Sakan Sakan Sakan Sakan Sakan Sakan		
	UD	inesh Kumar, N	Manaranjan Pradhan: "Machine Lear	ning Using Python", W	'iley, 2019		
R.2	Cha 201		"Python for everybody: exploring	data in Python 3", Ch	arles Severance.		
Useful L							
1			s.nptel.ac.in/noc21_cs69/preview		gades discovered the three seasons and the halo garder accompanies who dispose a discovered		
2	https://nptel.ac.in/courses/106/106/106106179/				dynamical and the familiar and the state of		

	Course Outcomes	CL	Class Sessions
MCS1105.1	Analyze Data Science w.r.t. history and data wrangle	4	9
MCS1105.2	Apply the concept of Machine Learning	3	9
MCS1105.3	Analyze advance algorithm and data structure	4	9
MCS1105.4	Build Information Retrieval Technique and understand searching web technique	6	9
MCS1105.5	Analyze big data security	5	9



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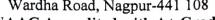
Program: M. Tech Computer Science & Engineering					
Semester-I	M	CS1107 Distribu			
	Teaching Scheme Examination Scheme				on Scheme
Theory		3 Hrs/week		CT-I	15 Marks
Tutoria		-		CT-II	15 Marks
Total Cred		3	•	CA	10 Marks
Duration of				ESE	60 Marks
		: Database Mana	gement System	Total Marks	100 Marks
1			Course Contents		
Unit I	Distr Distr Integ	ributed Transpare ributed Transpare grity Constraints i	s: What and Why?; The Distributed Databa ncy the Reference Architecture for Distributed I ency for Read-Only and Applications, Distribute in Distributed Databases	Databases, Data ed Database Acc	ess Primitives,
Unit II	Distributed database design: a framework for distributed database design, the design of database fragmentation, the allocation of fragments. Translation global queries to fragment queries, equivalence transformation for queries. Transforming global queries into fragment queries. distributed grouping and aggregate function evaluation, parametric queries				
Unit III	Query optimization: problems in query Optimization, objectives in query process optimization. simpler representation of queries, model for query optimization, - join query, general queries, 'concept of two phase commit, concept of replication, snapshot on replication and multi master replication. conflict resolution in multi master replication,				
Unit IV	The Management of Distributed Transactions: A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, and Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.				
Unit V	Reliability: Basic Concepts, Nonblocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of In consistency, Check points and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection, distributing computing in CORBA				
Text Bool	ks				
T.1	1985		- Principles and Systems; Stefano Ceri, Guisep		
T.2	Database Systems- Design, Implementation and Management; Peter Rob, Carlos Coronnel; Course Technology; 2000				
T.3	Object Oriented Database Systems – Approaches and Architectures; C. S. R. Prabhu; Prentice Hall of India				

Reference	ee Books				
R.1	Principles of Distributed database systems by M.T. Ozsu/S. Sridhar, Pearson education				
R.2	Decree Education 2007				
R.3	Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez ,Pearson Education,2ndEdition.19.				
Useful Links					
1	https://nptel.ac.in/courses/106/106106168/				
2	https://onlinecourses.swayam2.ac.in/cec19_cs05/preview				

	Course Outcomes	CL	Class Sessions
MCS1107.1	Analyze the Transaction Management in Databases with different protocols	4	9
MCS1107.2	Evaluate the various non-relational database like Active databases, deductive databases and temporal databases	5	9
MCS1107.3	Apply knowledge of Query Optimization Techniques in organization	4	9
MCS1107.4	Analyze the important aspects of Single and Multilevel dynamic Indexing	4	9
MCS1107.5	Create a Distributed Computing model.	6	9



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Program: M. Tech. Computer Science & Engineering						
Semester-I MCS1109: Advanced Operating System & Design						
	ching Scheme Examination Scheme		on Scheme			
Theory	3 Hrs/week		CT-I	15 Marks		
Tutorial			CT-II	15 Marks		
Total Cred	lits 3		CA	10 Marks		
	f ESE: 3Hrs		ESE	60 Marks		
Pre-Requis		stem, Computer Architecture,	Total Marks	100 Marks		
-		Course Contents				
Unit I	Networks and Ca Synchronization, P	stem: System Architecture: Motivatio ching. Multiprocessor OS: Structure, cocessor Scheduling, Memory managem	Design Issue, I	nreads, Process		
Unit II	Distributed Operating System: Introduction, Architectures, Issues in Distributed operating systems, Communication Network and Primitives, Limitations of Distributed Systems, Lamport's logical clock, Vector clock, Causal ordering of Message, Global states, Chandy-Lamport's global state recording algorithm, Cuts of Distributed Computation					
Unit III	Distributed Mutual Exclusion and Deadlock Detection: Mutual Exclusion: Introduction, Classification of Mutual Exclusion Algorithms, Preliminaries, NonToken-Base Algorithm, Token-Base Algorithms. Deadlock Detection: Introduction, Issue in deadlock detection and Resolution, Control Organization, Deadlock Detection Algorithm- Centralized, Distributed and Hierarchical.					
Unit IV	Distributed Resource Management: Distributed File systems: Architecture, Mechanisms and Design Issues. Distributed Shared Memory: Architecture, Algorithms, Memory Coherence,					
Unit V	Failure Recovery and Fault Tolerance: Recovery: Basic Concepts, Classification of Failures, Basic Approaches to Recovery, Recovery in Concurrent System, Synchronous and Asymphronous Check pointing and Recovery, Fault Tolerance, Issuez, Theorems 121					

Text Boo	ks				
T.1	Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001				
T.2	Andrew S. Tanenbaum, "Distributed operating system", Pearson education, 2003				
Reference	e Books				
R.1	Pradeep K. Sinha, "Distributed operating system-Concepts and design", PHI, 2003				
R.2	Andrew S. Tanenbaum, "Modern operating system", PHI, 2003				
Useful Links					
1	https://nptel.ac.in/courses/106/106/106106168/				
2	https://nptel.ac.in/courses/106/106/106106168/				

	Course Outcomes	CL	Class Sessions
MCS1109.1	Evaluate multiprocessor systems	4	9
MCS1109.2	Analyze distributed architecture, design issues and foundation of distributed systems.	4	9
MCS1109.3	Analyze the deadlock detection and Mutual Exclusion of distributed OS.	4	9
MCS1109.4	Evaluate distributed resource management and scheduling	4	9
MCS1109.5	Analyze failure recovery, consensus and agreement algorithm in Distributed Systems.	5	. 9

Deptt. (CSE)

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