

FORMS / FORMATS (ISO 9001:2015)

Doc. No: FAF/L4

Release No. 1.0 Date: 10/07/2017 Section: PP 04

Form No.: R/PP 04/03

COURSE PLANNING

Department: Master of Computer Application

Academic Year: 2020

Course Year :

IV Sem MCA

Subject

Advanced Algorithm

Subject Code:

MCA402T

Faculty Name:

Roshini .B

Designation :

Assistant Professor

Staff Signature

Principal/Director Krupanidhi Group of Institutions 12/1 Chikkabellandur Village, Carmelaram Road Post Varthur Hobli

Bangalore - 560 035

Principal Signature

Prepared by: Dr. Badrunnisa. S

Signature:

Designation: ISO Coordinator

Approved by: Dr. Samuel Paul Isaac

Signature:

Designation: Director

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COURSE OUTLINE

Pre Requisites:

- Knowledge about basic Algorithm
- Advanced mathematical background
- Understanding of statistics/probability (scientific and financial programming), abstract algebra and number theory.

Brief Note on Course Description (in terms of Bullet Points):

Unit -1

- Growth of Functions
- Asymptotic notations Standard notations and common functions
- Recurrences and Solution of Recurrence equations
- The substitution method
- The recurrence tree method
- The master method
- Amortized Analysis: Aggregate, Accounting and Potential Methods

Unit -2

- Bellman Ford Algorithm
- Single source shortest paths in a DAG
- Johnson's Algorithm for sparse graphs
- Flow networks and Ford-Fulkerson method
- Maximum bipartite matching.

Unit -3:

Representation of polynomials

The DFT and FFT

Efficient implementation of FFT

Number -Theoretic Algorithms

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Elementary notions

GCD

- Modular Arithmetic
- · Solving modular linear equations
- The Chinese remainder theorem
- Powers of an element
- RSA cryptosystem
- Primality testing
- Integer factorization.

Unit -4

- String-Matching Algorithms: Naïve string Matching
- Rabin Karp algorithm
- · String matching with finite automata
- Knuth-Morris-Pratt algorithm Boyer Moore algorithms
- Approximation Algorithms
- The vertex-cover problem;
- The traveling-sales-person problem
- The set covering problem
- The subset-sum problem.

Unit-5

- Parallel Sorting Algorithms
- Parallel Search Algorithms
- Introduction to Amortization.

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Course Learning Objectives:

- To implement advance analytics techniques and tools to solve computational problems and use them with dexterity.
- To inculcate skills to critically analyse, design, develop various algorithms which can be used in advanced analytics
- To provide the foundations of the practical implementation and usage of algorithms and data structures
- Analyse the asymptotic performance of algorithms and write rigorous correctness proofs for algorithms.
- · Apply important algorithmic design paradigms and methods of analysis

Course Learning Outcomes:

At the End of the Course the Students will be able to:

- · Have insight to advance analytics techniques and tools
- Understanding of various algorithms used in advanced analytics

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COURSE PLAN

Торіс	Topic Learning Objectives	Teaching/ Learning Strategies	Assessment strategy and tools	Time (in hours)		On (in hours)	
Analysis Techniques	Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method; Amortized Analysis: Aggregate, Accounting and Potential Methods.	Black board/PPT	Test/ Viva/ Sessional	12			
Graph Algorithms	Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method; Maximum bipartite matching.	Black board/PPT	Test/ Viva/ Sessional	10			
Polynomials and the FFT	Representation of polynomials; The DFT and FFT; Efficient implementation of FFT. Number - Theoretic Algorithms: Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem; Powers of an element; RSA cryptosystem; Primality testing; Integer factorization	Black board/PPT	Test/ Viva/ Sessional	10			
String-Matching Algorithms	Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm Boyer - Moore algorithms. Approximation Algorithms: The vertex-cover problem; The traveling-sales-person problem; The set covering problem; The subset-sum problem.	Black board/PPT	Test/ Viva/ Sessional	10			
Introduction Parallel Algorithms	Parallel Sorting Algorithms, Parallel Search Algorithms. Introduction to Amortization.	Black board/PPT	Test/ Viva/ Sexsional	10			

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Designation: ISO Coordinator

Signature: Dr. Samuel Paul Isaac
Signature: Design Principal Director
Design Principal Crown of Institutions
Krupanidhi Group of Institutions 12/1 Chikkabellandup Village

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COURSE PLAN (Hour wise)

S N	Date of Unit / Chapter Topic coverage details in Brief		Time in min	sylla plann cov	ver	
					L	P
1.	10/04/2020	Unit 1/ Analysis Techniques	Induction -5m Introduction to Algorithm-40m Summary-5m Student Attendance-5m	55	1.9	
2.	11/04/2020	Unit 1/ Analysis Techniques	Review-5m Growth of functions-40m Summary-5m Attendance -5m	55	3.8	
3.	13/04/2020	Unit 1/ Analysis Techniques	Review-5m Asymptotic Notations-40m Summary-5m Attendance-5m	55	5.7	
4.	14/04/2020	Unit 1/ Analysis Techniques	Review-5m Standard notation and common functions- 40m Summary-5m Attendance-5m	55	7.6	
5.	15/04/2020	Unit 1/ Recurrences	Review-5m Recurrences and solution of recurrences equation-40m Summary-5m Attendance-5m	55	9.6	
6.	17/04/2020	Unit 1/ Recurrences	Review-5m Method for solving recurrence equations- substitution method-40m Summary-5m Attendance-5m	55	11.5	
7.	18/04/2020	Unit 1/ Recurrences	Review-5m Method for solving recurrence equations- tree method-40m Summary-5m Attendance-5m	55	13.4	

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8.	18/04/2020	Unit 1/ Recurrences	Review-5m Example for recurrences – tree method- 40m Summary-5m Attendance-5m	55	15.3
9.	20/04/2020	Unit 1/ Recurrences	Review-5m Method for solving recurrence equations- the master theorem method-40m Summary-5m Attendance-5m	55	17.3
10.	21/04/2020	Unit 1/ Recurrences	Review-5m Determining case of the master theorem method-40m Summary-5m Attendance-5m	55	19.2
11.	22/04/2020	Unit 1/ Amortized Analysis	Review-5m Amortized Analysis: 3 methods-40m Summary-5m Attendance-5m	55	21.1
12.	23/04/2020	Unit 1/ Amortized Analysis	Review-5m Aggregate Analysis -stack operation, binary counter-40m Summary-5m Attendance-5m	55	23
13.	24/04/2020	Unit 2/All-Pairs shortest paths	Review-5m Shortest Path Algorithm-40m Summary-5m Attendance-5m	55	25
14.	25/04/2020	Unit 2/All-Pairs shortest paths	Review-5m Bellman - Ford Algorithm for DAG, topological sorting-40m Summary-5m Attendance-5m	55	26.9
15.	26/04/2020	Unit 2/All-Pairs shortest paths	Review-5m Johnson's Algorithm for sparse graphs Summary-5m Attendance-5m	55	28.8
16.	26/04/2020	Unit 2/All-Pairs shortest paths	Review-5m Dijkstra's Algorith,Reweighting technique- 40m Summary-5m Attendance, 5m	55	30.7

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2/05/2020	Unit 2/All-Pairs shortest paths Unit 2/All-Pairs	Dijkstra's Algorithm-40m Summary-5m Attendance-5m Review-5m		32.6
2/05/2020	•	Attendance-5m Review-5m		32.0
2/05/2020	Unit 2/All-Pairs	Review-5m		
2/05/2020	Unit 2/All-Pairs			1 1
	Unit 2/All-Pairs		55	
	Unit 2/All-Pairs	Johnson's Algorithm explanation using		
		example graph-40m		30
	shortest paths	Summary-5m		
		Attendance-5m		
4/05/2020	Unit 2/ Graph	Review-5m	55	+ +
	Algorithms	Flow Networks-40m		
	, Ligorianis	Summary-5m		34.7
	1 10 1 2 10 10 10	Attendance-5m		
5/05/2020	Unit 2/ Graph		55	+ +
3/03/2020		Terren Din	55	
	Aigoriums			34.7
6/05/2020	Hait 2/ Comb		55	+ +
6/05/2020			33	
	Algorithms			36.5
				30.5
7/05/2020	11-1-2/C1			
7/05/2020			55	
	Algorithms			1/2/6/
				42.3
9/05/2020	Unit 3/		55	
				40.3
				10.5
11/05/2020	Unit 3/	Review-5m	55	
	Polynomials and	The DFT and FFT-40m		42.3
	the FFT	Summary-5m		42.5
		Attendance-5m		
12/05/2020	Unit 3/	Review-5m	55	
	Polynomials and	The DFT and FFT-40m		440
	the FFT	Summary-5m		44.2
		Attendance-5rh		
13/05/2020	Unit 3/	Review-5m AV	55	
_	Polynomials and	Number - Theoretic Algorithms -40m		46.1
	the FFT	\Summary 3m		
	drunnisa. S	Approved by: Dr Samuel Pau	I Isaac	
	oordinator Er	Drincipasionatola statutions	1.4	77
ı	13/05/2020 d by: Dr. Ba re:	Algorithms 6/05/2020 Unit 2/ Graph Algorithms 7/05/2020 Unit 2/ Graph Algorithms 9/05/2020 Unit 3/ Polynomials and the FFT 11/05/2020 Unit 3/ Polynomials and the FFT 12/05/2020 Unit 3/ Polynomials and the FFT 13/05/2020 Unit 3/ Polynomials and the FFT 13/05/2020 Unit 3/ Polynomials and the FFT 13/05/2020 Unit 3/ Polynomials and the FFT	Solution Solution	Signature Sign

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			Attendance-5m		
	13/05/2020	Unit 3/	Review-5m	55	
27.		Polynomials and	Elementary notions-40m		48.0
21.		the FFT	Summary-5m		48.0
			Attendance-5m		
	14/05/2020	Unit 3/	Review-5m	55	
28.		Polynomials and	GCD-40m		50
		the FFT	Summary-5m		30
			Attendance-5m		
Term	: 1 Ses	sional:1	Percentage of to	opic Co	overed:50%
	16/05/2020	Unit 3/	Review-5m	55	
29.		Polynomials and	Solving modular linear equations-40m		52.9
29.		the FFT	Summary-5m		32.9
	1		Attendance-5m		
	19/05/2020	Unit 3/	Review-5m	55	
30.		Polynomials and	The Chinese remainder theorem-40m		55.7
30.		the FFT	Summary-5m		33.7
			Attendance-5m		
	20/05/2020	Unit 3/	Review-5m	55	
		Polynomials and	Powers of an element; RSA cryptosystem-		
31.		the FFT	40m		59.6
			Summary-5m		
			Attendance-5m		+
	21/05/2020	Unit 3/	Review-5m	55	
32.	100	Polynomials and	Primality testing; Integer factorization-40m		61.5
		the FFT	Summary-5m		01.0
			Attendance-5m		+
	22/05/2020	Unit 4/	Review-5m	55	
		String Matching	String-Matching Algorithms: Naïve string		40.7
33.		Algorithms	Matching -40m		63.5
			Summary-5m		
			Attendance-5m		

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34.	22/05/2020	Unit 4/ String Matching Algorithms	Review-5m Rabin - Karp algorithm-40m Summary-5m Attendance-5m	55	65.1
35.	26/05/2020	Unit 4/ String Matching Algorithms	Review-5m String matching with finite automata-40m Summary-5m Attendance-5m	55	67.3
36.	27/05/2020	Unit 4/ String Matching Algorithms	Review-5m Knuth-Morris-Pratt algorithm-40m Summary-5m Attendance-5m	55	69.4
37.	29/05/2020	Unit 4/ String Matching Algorithms	Review-5m Boyer – Moore algorithms-40m Summary-5m Attendance-5m	55	71.2
38.	29/05/2020	Unit 4/ String Matching Algorithms	Review-5m Boyer – Moore algorithms solving examples-40m Summary-5m Attendance-5m	55	73.1
39.	30/05/2020	Unit 4/ String Matching Algorithms	Review-5m Approximation Algorithms: The vertex- cover problem-40m Summary-5m Attendance-5m	55	75
40.	30/05/2020	Unit 4/ String Matching Algorithms	Review-5m The traveling-sales-person problem-40m Summary-5m Attendance-5m	55	76.6
41.	1/06/2020	Unit 4/ String Matching Algorithms	Review-5m The set covering problem-40m Summary-5m Attendance-5m	55	78.8
42.	2/06/2020	Unit 4/ String Matching Algorithms	Review-5m The subset-sum problem-40m Summary-5m Attendance-5m	55	80.7
43.	3/06/2020	Unit 5/ Parallel Algorithms	Review-5m Parallel Algorithms, Models-40m Summary-5m Attendance-5m	55	82.6

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	3/06/2020	Unit 5/	Review-5m	55	
44.		Parallel	PRAM, Models-40m		84.6
44.		Algorithms	Summary-5m		04.0
			Attendance-5m		
	5/06/2020	Unit 5/	Review-5m	55	
		Parallel	Parallel Sorting Algorithms: Enumeration		
45.		Algorithms	Sort-40m		86.5
			Summary-5m		
			Attendance-5m		
	3/06/2020	Unit 5/	Review-5m	55	1 1
		Parallel	Parallel Sorting Algorithms: Enumeration		
46.		Algorithms	Sort-40m		88.4
			Summary-5m		
			Attendance-5m		\perp
	3/06/2020	Unit 5/	Review-5m	55	1 1
47.		Parallel	Odd-Even Transposition sort-40m		90.3
.,.		Algorithms	Summary-5m		70.5
			Attendance-5m		+
	6/06/2020	Unit 5/	Review-5m	55	1 1
		Parallel	Parallel searching Algorithms: Breadth-		
48.		Algorithms	first-40m		92.3
			Summary-5m		
	0 (06 (3030	11-1-5/	Attendance-5m	**	+
	8/06/2020	Unit 5/	Review-5m	55	1 1
40		Parallel	Parallel searching Algorithms: Depth-first- 40m		94.2
49.		Algorithms	Summary-5m		94.2
			Attendance-5m		1 1
	2/07/2020	Unit 5/	Review-5m	55	+
	2/07/2020	Parallel	Parallel searching Algorithms: Best-First-	33	
50.		Algorithms	40m		96.1
50.		Aigoriums	Summary-5m		90.1
			Attendance-5m		
		1	Attenualice-Jili	L	

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51.	2/07/2020	Unit 5/ Parallel Algorithms	Review-5m Introduction to Amortization-40m Summary-5m Attendance-5m	55	98.0	
52.	3/07/2020	Unit 5/ Parallel Algorithms	Review-5m Amortization-40m Summary-5m Attendance-5m	55	100	

Term: 2

Sessional:2

Percentage of topic Covered:100%

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