



KRUPANIDHI GROUP OF INSTITUTIONS, BANGALORE

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

Roshini
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Krupanidhi Group of Institutions
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Prepared by: **Dr. Badrunnisa. S**
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Designation: **ISO Coordinator**

Approved by: **Dr. Samuel Paul Isaac**
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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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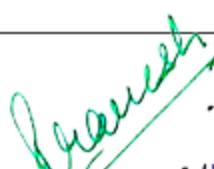
Course Learning Objectives:

- 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

Topic	Topic Learning Objectives	Teaching/ Learning Strategies	Assessment strategy and tools	Time (in hours)		Deviati on (in hours)	
				L	P	L	P
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/ Sessional	10			

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COURSE PLAN (Hour wise)

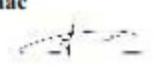
S N	Date of Handling	Unit / Chapter Name	Topic coverage details in Brief	Time in min	% of syllabus planned to cover	
					L	P
1.	10/04/2020	Unit 1/ Analysis Techniques	Induction -5m Introduction to Algorithm-40m Summary-5m Student Attendance-5m	55	1.9	
2.	11/04/2020	Unit 1/ Analysis Techniques	Review-5m 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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17.	28/04/2020	Unit 2/All-Pairs shortest paths	Review-5m Dijkstra's Algorithm-40m Summary-5m Attendance-5m	55	32.6	
18.	2/05/2020	Unit 2/All-Pairs shortest paths	Review-5m Johnson's Algorithm explanation using example graph-40m Summary-5m Attendance-5m	55	30	
19.	4/05/2020	Unit 2/ Graph Algorithms	Review-5m Flow Networks-40m Summary-5m Attendance-5m	55	34.7	
20.	5/05/2020	Unit 2/ Graph Algorithms	Review-5m Ford-Fulkerson method-40m Summary-5m Attendance-5m	55	34.7	
21.	6/05/2020	Unit 2/ Graph Algorithms	Review-5m Example program for Ford-Fulkerson method-40m Summary-5m Attendance-5m	55	36.5	
22.	7/05/2020	Unit 2/ Graph Algorithms	Review-5m Maximum Bipartite matching, Max -flow-min cut theorem-40m Summary-5m Attendance-5m	55	42.3	
23.	9/05/2020	Unit 3/ Polynomials and the FFT	Review-5m Representation of polynomials-40m Summary-5m Attendance-5m	55	40.3	
24.	11/05/2020	Unit 3/ Polynomials and the FFT	Review-5m The DFT and FFT-40m Summary-5m Attendance-5m	55	42.3	
25.	12/05/2020	Unit 3/ Polynomials and the FFT	Review-5m The DFT and FFT-40m Summary-5m Attendance-5m	55	44.2	
26.	13/05/2020	Unit 3/ Polynomials and the FFT	Review-5m Number -Theoretic Algorithms -40m Summary-5m	55	46.1	

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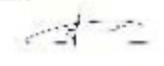
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			Attendance-5m			
27.	13/05/2020	Unit 3/ Polynomials and the FFT	Review-5m Elementary notions-40m Summary-5m Attendance-5m	55	48.0	
28.	14/05/2020	Unit 3/ Polynomials and the FFT	Review-5m GCD-40m Summary-5m Attendance-5m	55	50	

Term: 1 Sessional:1 Percentage of topic Covered:50%

			Review-5m Solving modular linear equations-40m Summary-5m Attendance-5m	55	52.9	
29.	16/05/2020	Unit 3/ Polynomials and the FFT	Review-5m The Chinese remainder theorem-40m Summary-5m Attendance-5m	55	55.7	
30.	19/05/2020	Unit 3/ Polynomials and the FFT	Review-5m Powers of an element; RSA cryptosystem-40m Summary-5m Attendance-5m	55	59.6	
31.	20/05/2020	Unit 3/ Polynomials and the FFT	Review-5m Primality testing; Integer factorization-40m Summary-5m Attendance-5m	55	61.5	
32.	21/05/2020	Unit 3/ Polynomials and the FFT	Review-5m String-Matching Algorithms: Naïve string Matching -40m Summary-5m Attendance-5m	55	63.5	
33.	22/05/2020	Unit 4/ String Matching Algorithms	Review-5m String-Matching Algorithms: Naïve string Matching -40m Summary-5m Attendance-5m	55		

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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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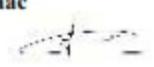
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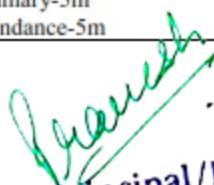
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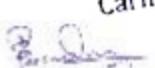
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44.	3/06/2020	Unit 5/ Parallel Algorithms	Review-5m PRAM, Models-40m Summary-5m Attendance-5m	55	84.6	
45.	5/06/2020	Unit 5/ Parallel Algorithms	Review-5m Parallel Sorting Algorithms: Enumeration Sort-40m Summary-5m Attendance-5m	55	86.5	
46.	3/06/2020	Unit 5/ Parallel Algorithms	Review-5m Parallel Sorting Algorithms: Enumeration Sort-40m Summary-5m Attendance-5m	55	88.4	
47.	3/06/2020	Unit 5/ Parallel Algorithms	Review-5m Odd-Even Transposition sort-40m Summary-5m Attendance-5m	55	90.3	
48.	6/06/2020	Unit 5/ Parallel Algorithms	Review-5m Parallel searching Algorithms: Breadth-first-40m Summary-5m Attendance-5m	55	92.3	
49.	8/06/2020	Unit 5/ Parallel Algorithms	Review-5m Parallel searching Algorithms: Depth-first-40m Summary-5m Attendance-5m	55	94.2	
50.	2/07/2020	Unit 5/ Parallel Algorithms	Review-5m Parallel searching Algorithms: Best-First-40m Summary-5m Attendance-5m	55	96.1	


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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%**

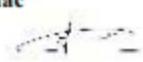

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