	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

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**

Only the electronic file of this document is CONTROLLED. Printed copies of this document are UNCONTROLLED. Users of this document are responsible for ensuring that printed copies are valid at time of use

	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 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

Principal/Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village,
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

Prepared by: **Dr. Badrunnisa. S** Signature: Designation: **ISO Coordinator**	Approved by: **Dr. Samuel Paul Isaac** Signature: Designation: **Director**

Only the electronic file of this document is CONTROLLED. Printed copies of this document are UNCONTROLLED. Users of this document are responsible for ensuring that printed copies are valid at time of use

- 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.

Principal/Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village,
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

	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 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

Principal/Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village,
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

Prepared by: **Dr. Badrunnisa. S** Signature: Designation: **ISO Coordinator**	Approved by: **Dr. Samuel Paul Isaac** Signature: Designation: **Director**

Only the electronic file of this document is CONTROLLED. Printed copies of this document are UNCONTROLLED. Users of this document are responsible for ensuring that printed copies are valid at time of use

	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 PLAN

Topic	Topic Learning Objectives	Teaching/ Learning Strategies	Assessment strategy and tools	Time (in hours)		Deviation (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			

Prepared by: **Dr. Badrunnisa. S** Signature: Designation: **ISO Coordinator**	Approved by: **Dr. Samuel Paul Isaac** Signature: Designation: **Principal/Director**

Principal/Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

Only the electronic file of this document is CONTROLLED. Printed copies of this document are UNCONTROLLED. Users of this document are responsible for ensuring that printed copies are valid at time of use

	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 PLAN (Hour wise)

SN	*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	

Prepared by: **Dr. Badrunnisa. S** Signature: Designation: **ISO Coordinator**	Approved by: **Dr. Samuel Paul Isaac** Signature: Designation: **Director**

Principal/Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village,
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

Only the electronic file of this document is CONTROLLED. Printed copies of this document are UNCONTROLLED. Users of this document are responsible for ensuring that printed copies are the latest issue.

	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**

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	

Prepared by: **Dr. Badrunnisa. S** Signature: Designation: **ISO Coordinator**	Approved by: **Dr. Samuel Paul Isaac** Signature: Designation: **Director**

Principal / Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village,
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

Only the electronic file of this document is CONTROLLED. Printed copies of this document are UNCONTROLLED. Users of this document are responsible for ensuring that printed copies are valid for the time of use.

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	

Prepared by: **Dr. Badrunnisa. S**
Signature:
Designation: **ISO Coordinator**

Approved by: **Dr. Samuel Paul Isaac**
Signature:
Designation: **Director**

Principal/Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village,
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

Only the electronic file of this document is CONTROLLED. Printed copies of this document are UNCONTROLLED. Users of this document are responsible for ensuring that printed copies are valid at their point of use.

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

Principal/Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village,
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

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	

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	

Principal/Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village,
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

Prepared by: **Dr. Badrunnisa. S** Signature: Designation: **ISO Coordinator**	Approved by: **Dr. Samuel Paul Isaac** Signature: Designation: **Director**

Only the electronic file of this document is CONTROLLED. Printed copies of this document are UNCONTROLLED. Users of this document are responsible for ensuring that printed copies are valid at time of use

	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**

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%**

Principal/Director
Krupanidhi Group of Institutions
12/1 Chikkabellandur Village,
Carmelaram Road Post Varthur Hobli
Bangalore - 560 035

Prepared by: **Dr. Badrunnisa. S** Signature: Designation: **ISO Coordinator**	Approved by: **Dr. Samuel Paul Isaac** Signature: Designation: **Director**

Only the electronic file of this document is CONTROLLED. Printed copies of this document are UNCONTROLLED. Users of this document are responsible for ensuring that printed copies are valid at time of use