J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

√√√

ACADEMIC YEAR **2013-14**

http://www.jbiet.edu.in

	COURSE PLAN	2013-14
		Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**

COURSE DETAILS

Name Of The Programme:: Batch:: **2012-13**
Designation::
Year :II Semester :II
Department:: **CSE**
Title of The Subject **DAA** Subject Code : 54016
No of Students **115**

	COURSE PLAN	2013-14
		Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**

1. TARGET

a) Percentage Pass :100

b) Percentage I class :85

2. COURSE PLAN

(Please write how you intend to cover the contents: i.e., coverage of Units by lectures, guest lectures, design exercises, solving numerical problems, demonstration of models, model preparation, or by assignments, etc.)

a) coverage of Units by lectures
b) design exercises
c) solving numerical problems
d) by assignments

3. METHOD OF EVALUATION

3.1. √ Continuous Assessment Examinations (CAE 1, CAE 2)

3.2. √ Assignments / Seminars

3.3. √ Mini Projects √

3.4. √ Quiz

3.5. √ Term End Examination

3.6. √ Others

4. List out any new topic(s) or any innovation you would like to introduce in teaching the subject in this Semester.

Signature of HOD
Date:

Signature of Faculty
Date:

	GUIDELINES TO STUDY THE SUBJECT	2013-14
		Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**

Designation: **Asst.Professor**

Department:: **CSE**

Guidelines for Preparing the Course:

Course Description:
This course introduces concepts related to the design and analysis of algorithms. Specifically, it discusses recurrence relations, and illustrates their role in asymptotic and probabilistic analysis of algorithms. It covers in detail greedy strategies divide and conquer techniques, dynamic programming and max flow - min cut theory for designing algorithms, and illustrates them using a number of well-known problems and applications. It also covers popular graph and matching algorithms, and basics of randomized algorithms and computational complexity. However, the depth of coverage of complexity classes and intractability, approximation algorithms, and randomized algorithms, will be as time permits.

Course Objectives:
1. Analyze the asymptotic performance of algorithms 2. Write rigorous correctness proofs for algorithms 3. Demonstrate a familiarity with major algorithms and data structures 4. Apply important algorithmic design paradigms and methods of analysis 5. Synthesize efficient algorithms in common engineering design situations 6. Familiarizing students with specific algorithms for a number of important computational problems like sorting, searching, and graphs, …etc, 7. Introducing the concept of NP-complete problems and different techniques to deal with them.

Learning Outcomes:
1. Argue the correctness of algorithms using inductive proofs and invariants. 2. Analyze worst-case running times of algorithms using asymptotic analysis. 3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms. 4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them. 5. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them. 6. Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them. 7. Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the

difference between a randomized algorithm and an algorithm with probabilistic inputs.

8. Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.
9. Explain what amortized running time is and what it is good for. Describe the different methods of amortized analysis (aggregate analysis, accounting, potential method). Perform amortized analysis.
10. Explain what competitive analysis is and to which situations it applies. Perform competitive analysis.
11. Compare between different data structures. Pick an appropriate data structure for a design situation.
12. Explain what an approximation algorithm is, and the benefit of using approximation algorithms.. Analyze the approximation factor of an algorithm.

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
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Department:: **CSE**

On completion of this Subject / Course the student shall be able to:

S.No.	Objectives	Outcomes
1.	Apply important algorithmic design paradigms and methods of analysis.	1,2,8,9,10
2.	Demonstrate a familiarity with major algorithms and data structures	1,2,3,4
3.	Synthesize efficient algorithms in common engineering design situations.	3,4,5,10
4.	Write rigorous correctness proofs for algorithms.	9,10,11,12
5.	Apply important algorithmic design paradigms and methods of analysis.	1,2,8,9,10

Signature of Faculty
Date:

Note: For each of the OBJECTIVE indicate the appropriate OUTCOMES to be achieved.
Kindly refer Page 16, to know the illustrative verbs that can be used to state the objectives.

	COURSE OUTCOMES	2013-14
		Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**

The expected outcomes of the Course / Subject are:

S.No.	General Categories of Outcomes	Specific Outcomes of the Course
A.	An ability to apply knowledge of mathematics, science, and engineering	An ability to apply knowledge of engineering
B.	An ability to design and conduct experiments, as well as to analyze and interpret data	An ability to design and conduct experiments, as well as to analyze and interpret data
C.	An ability to design a system, component, or process to meet desired needs within realistic Constraints such as economic, environmental, social, political, ethical, health and safety, Manufacturability and sustainability	
D.	An ability to function on multi-disciplinary teams	
E.	An ability to identify, formulate, and solve engineering problems	
F.	An understanding of professional and ethical responsibility	
G.	An ability to communicate effectively	
H.	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
I.	A recognition of the need for, and an ability to engage in life-long learning	
J.	A knowledge of contemporary issues	
K.	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Objectives – Outcome Relationship Matrix (Indicate the relationships by ☒ mark).

Objectives \ Outcomes	A	B	C	D	E	F	G	H	I	J	K
1.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

	COURSE SCHEDULE	2013-14
		Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**

The Schedule for the whole Course / Subject is::

S. No.	Description	Duration (Date)		Total No. of Periods
		From	To	
1.	UNIT-I: Introduction to Algorithms	9/12/2013	31/12/2013	10
2.	UNIT-II: Disjoint Sets	1/1/2014	20/1/2014	9
3.	UNIT-III: Divide and Conquer	21/1/2014	28/1/2014	8
4.	UNIT-IV: Greedy Method	29/1/2014	6/2/2014	10
5.	UNIT-V:Dynamic Programming	13/2/2014	1/3/2014	8
6.	UNIT-VI: Back Tacking	3/3/2014	10/3/2014	8
7	UNIT-VII: Branch and Bound	11/3/2014	22/3/2014	6
8	UNIT-VIII: NP-Hard and NP-Complete	24/3/2014	4/4/2014	6

Total No. of Instructional periods available for the course: Hours / Periods

	SCHEDULE OF INSTRUCTIONS UNIT - I	2013-14 Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**
The Schedule for the whole Course / Subject is::

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	9/12/13	1	Understanding what is an algorithm		TB1: 1.1
2	10/12/13	1	Introduction to Algorithm, characteristics		TB1: 1.1
3	11/12/13	1	Understanding algorithm specifications		TB1: 1.1
4	12/12/13	1	Pseudo conventions		TB1: 1.2.1
5	12/12/13	1	Performance analysis of an algorithm		TB1: 1.3.1,1.3.2 & R1:4.2
6	13/12/13	1	Time complexity, space complexity, step count method		TB1: 1.3.1,1.3.2 & R1:4.2
7	16/12/13	1	Asymptotic notation		TB1: 1.3.3 &R1:3.1-3.5
8	17/12/13	1	Analysis of algorithms		R1: 5.4, 17.1 – 17.4 & R1:4.6
9	18/12/13	1	Probabilistic analysis, Amortized analysis		R1: 5.4, 17.1 – 17.4 & R1:4.6
10	19/12/2013	1	Problems on algorithms		

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.
3. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - II	2013-14 Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**
The Schedule for the whole Course / Subject is::

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1		1	Disjoint sets, disjoint set operations		TB1:2.5.1
2		1	Disjoint sets, disjoint set operations		TB1:2.5.1
3		1	Union and find for sets		TB1:2.5.2
4		1	Weighted union and find algorithms		TB1:2.5.2
5		1	Spanning trees		TB1:4.5
6		1	Connected components		TB1:4.5
7		1	Biconnectedcomponents		TB1:6.4
8		1	Problems		

Signature of Faculty
Date

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2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.
MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - III	2013-14 Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**

The Schedule for the whole Course / Subject is::

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1		1	Understanding divide-and-conquer method		TB1: 3.1
2		1	Applications of Divide-and-conquer		TB1: 3.2
3		1	Binary search		TB1: 3.2
4		1	Quick sort		TB1: 3.5 & R2:3.5
5		1	Merge sort		TB1: 3.4
6		1	Merge sort		TB1: 3.4
7		1	Strasen's Matrix multiplication		TB1:3.7 & R2:6.2

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - IV	2013-14 Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**
The Schedule for the whole Course / Subject is::

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1		1	Understanding greedy method		TB1: 4.1
2		1	greedy general method		TB1: 4.1
3		1	Applications of greedy method		TB1: 4.1
4		1	Job sequencing with deadlines		TB1: 4.4 & R1:6.5
5		1	Knapsack problem		TB1:4.2
6		1	Minimum cost spanning trees, Prim's algorithm		TB1: 4.5 , 4.5.1 & R1:6.3.1-6.3.2
7		1	Kruskal's algorithm		TB1:4.5.2
8		1	Single source shortest path		TB1: 4.8
9		1	Tutorial		

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - V	2013-14 Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**
The Schedule for the whole Course / Subject is::

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1		1	Understanding dynamic programming		TB1: 5.1
2		1	General method		TB1: 5.1
3		1	Matrix chain multiplication		TB2:15.6
4		1	Optimal binary search trees		TB1: 5.5, & R2 : 4.5
5		1	Knapsack problem		TB1:5.7
6		1	All pair shortest path		TB1:5.3
7		1	Travelling salesman problem		TB1:5.9
8		1	Reliability design		TB1:5.8
9		1	Revision		
10		1	Tutorial		

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - VI	2013-14 Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**
The Schedule for the whole Course / Subject is::

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1		1	Understanding backtracking		TB1: 7.1 & R1:9.6
2		1	General method		TB1: 7.1 & R1:9.6
3		1	8-Queens problem		TB1: 7.2 & R1:9.6
4		1	sum of subsets		TB1: 7.3
5		1	graph coloring		TB1: 7.5
6		1	Hamiltonian cycles		TB1: 7.4
7		1	Tutorial		
8		1	Revision		

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - VII	2013-14 Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**
The Schedule for the whole Course / Subject is::

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1		1	Branch and bound		TB1: 8.1
2		1	General method		TB1: 8.1
3		1	Knapsack problem		TB1: 8.2
4		1	LC branch and bound solution		TB1: 8.2.1
5		1	FIFO branch and bound solution		TB1: 8.2.2
6		1	Traveling salesperson problem		TB1: 8.3
7		1	Tutorial		
8		1	Revision		

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - VIII	2013-14 Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**
The Schedule for the whole Course / Subject is::

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1		1	Understanding NP hard and NP complete problems		TB1: 11.1, 11.1.1 & R1:12.5
2		1	Basic concepts, nondeterministic algorithms		TB1: 11.1, 11.1.1 & R1:12.5
3		1	NP hard class		TB1: 11.1.2
		1	NP complete class		TB1: 11.1.2
4		1	Cook's theorem		TB1: 11.2
		1	Tutorial		
5		1	Revision		
6		1	Revision		

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	COURSE COMPLETION STATUS	2013-14
		Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**

Subject:: **DAA** Subject Code:54016

Department:: **CSE**

Actual Date of Completion & Remarks, if any

Units	Remarks	Nos. of Objectives Achieved
Unit 1	Completed	
Unit 2	Completed	
Unit 3	Completed	
Unit 4	Completed	
Unit 5	Completed	
Unit 6	Completed	
Unit 7	ongoing	
Unit 8	ongoing	

Signature of Dean of School
Date:

Signature of Faculty
Date:

NOTE: AFTER THE COMPLETION OF EACH UNIT MENTION THE NUMBER OF OBJECTIVES ACHIEVED.

	TUTORIAL SHEETS - I	2013-14
		Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**
The Schedule for the whole Course / Subject is::

Date:

This Tutorial corresponds to Unit Nos.1&2 Time:

Q1. Define algorithm. Explain the characteristics of the algorithm

Q2. What are best case, average case, and worst-case performance? Explain

Q3. Write the algorithm for simple find?

Q4. Write the algorithm for collapsing find?

Q5. Write and explain the control abstraction for Divide and conquer

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the objectives to which these questions / Problems are related.

Signature of Dean of School
Date:

Signature of Faculty
Date:

	TUTORIAL SHEETS - II	2013-14
		Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**
The Schedule for the whole Course / Subject is::

Date:

This Tutorial corresponds to Unit Nos.3&4&5 Time:

Q1. Explain the Strassen's matrix multiplication concept with an example

Q2. The worst-case time of procedure MERGESORT is O(nlogn). What is its time in the best case? Can we say that the time for merge sort is O(nlogn)?

Q3. Explain the Prims' algorithm with an example. Analyze the time complexity of the algorithm ?

Q4. Consider the Knapsack instance n=6, m=165, (p1, p2, ..., p6) = (w1,w2, ...,w6) = (100,50,20,10,7,3). Generate the Si sets containing the pair (pi,wi) and thus find the optimal solution?.

Q5. Write an algorithm of matrix chain multiplication?

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the objectives to which these questions / Problems are related.

Signature of Dean of School
Date:

Signature of Faculty
Date:

	TUTORIAL SHEETS - III	2013-14
		Regulation: R12

FACULTY DETAILS:

Name of the Faculty:: **M.NAVEEN BABU**
Designation: **Asst.Professor**
Department:: **CSE**

Date:

This Tutorial corresponds to Unit Nos.6&7&8 Time:

Q1. Explain the BFS algorithm with an example ?

Q2. Write an algorithm of Biconnected components and also analyze its time Complexity?

Q3. Suggest a solution for 8 queen's problem.

Q4. Explain the principles of LIFO Branch and Bound

Q5. Explain NP hard problems.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the objectives to which these questions / Problems are related.

Signature of Dean of School
Date:

Signature of Faculty
Date:

	ILLUSTRATIVE VERBS FOR STATING INSTRUCTIONAL OBJECTIVES	2013-14
		Regulation: R12

These verbs can also be used while framing questions for Continuous Assessment Examinations as well as for End – Semester (final) Examinations.

ILLUSTRATIVE VERBS FOR STATING **GENERAL OBJECTIVES**

Know Comprehend	Understand Apply	Analyze Design	Generate Evaluate

ILLUSTRATIVE VERBS FOR STATING **SPECIFIC OBJECTIVES:**

A. Cognitive Domain

1	2	3	4	5	6
Knowledge	**Comprehension Understanding**	**Application** of knowledge & comprehension	**Analysis** of whole w.r.t. its constituents	**Synthesis** combination of ideas/constituents	**Evaluation** judgement
Define	Convert	Change	Breakdown	Categorize	Appraise
Identify	Defend	Compute	Differentiate	Combine	Compare
Label	Describe (a	Demonstrate	Discriminate	Compile	Conclude
List	procedure)	Deduce	Distinguish	Compose	Contrast
Match	Distinguish	Manipulate	Separate	Create	Criticize
Reproduce	Estimate	Modify	Subdivide	Devise	Justify
Select	Explain why/how	Predict		Design	Interpret
State	Extend	Prepare		Generate	Support
	Generalize	Relate		Organize	
	Give examples	Show		Plan	
	Illustrate	Solve		Rearrange	
	Infer			Reconstruct	
	Summarize			Reorganize	
				Revise	

B. Affective Domain		**C. Psychomotor Domain (skill development)**				
Adhere	Resolve	Bend	Dissect	Insert	Perform	Straighten
Assist	Select	Calibrate	Draw	Keep	Prepare	Strengthen
Attend	Serve	Compress	Extend	Elongate	Remove	Time
Change	Share	Conduct	Feed	Limit	Replace	Transfer
Develop		Connect	File	Manipulate	Report	Type
Help		Convert	Grow	Move preciselyReset		Weigh
Influence		Decrease	Handle	Operate	Run	
Initiate		Demonstrate	Increase	Paint	Set	

	LESSON PLAN **Unit-1**	2013-14 Regulation: R12

Name of the Faculty: **M.NAVEEN BABU**

Subject **Asst.Professor** Subject Code 54016

Unit I

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	**Introduction: Algorithm, Pseudo code for expressing algorithms**	**50min**	**T1**	Lecture method – Board & Chalk
2	**Analysis-Space complexity, Time complexity.**	**50min**	**T1**	Lecture method – Board & Chalk
3	**Asymptotic Notation- Big oh notation.**	**1.30 hr**	**T1**	PPT
4	**Omega notation, Theta notation and Little oh notation.**	**50min**	**T1**	PPT
5	**Probabilistic analysis**	**50min**	**T1**	Lecture method – Board & Chalk
6	**Amortized analysis**	**50min**	**T1**	Lecture method – Board & Chalk

On completion of this lesson the student shall be able to(Outcomes)

- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.
- Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.
- Explain what amortized running time is and what it is good for. Describe the different methods of amortized analysis (aggregate analysis, accounting, potential method). Perform amortized analysis.
- Explain what competitive analysis is and to which situations it applies. Perform competitive analysis.
- Compare between different data structures. Pick an appropriate data structure for a design situation.
- Explain what an approximation algorithm is, and the benefit of using approximation algorithms.. Analyze the approximation factor of an algorithm.

	ASSIGNMENT **Unit-I**	2013-14 Regulation: R12

Assignment / Questions

Assignment / Questions

1) What do you mean an algorithm. Explain the different design for algorithm.
2) What are the parameters for considering the time complexity of an algorithm.
3) Analyze the problem and justify your answer. If we apply insertion sort on super computer & Quick sort on PC the array of one million numbers in super computer which executes 100 million instrumentation/ second. While the PC executes only one million / second.
4) Give an optimal solution for the problem if (x and y) then a = b;
    a. Else if (not x) and y) then a = c;
    b. Else if (x and not y) then a = d;
    c. Else a = e;
5) Write the Tradeoff between Time complexity & Space complexity.
6) What are the basic steps for writing a good algorithm / program.
7) Define the asymptotic notation.
8) Write the following algorithm in an improved way.
    a. For (I = 1 to n)
    b. If (I < j) then Sum = Sum + nums[i];
9) What is Randomized Algorithm?

Signature of Faculty

Note: Mention for each question the relevant objectives and outcomes.

Signature of Faculty

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	LESSON PLAN Unit-II	2013-14
		Regulation: R12

Name of the Faculty: **M.NAVEEN BABU**

Subject **Asst.Professor** Subject Code 54016

Unit II

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	**Disjoint Sets- disjoint set operations, union and find algorithms.**	**50 min**	**T1**	Lecture method – Board & Chalk
2	**union and find algorithms.-Weighted union by rank**	**50 min**	**T2**	Lecture method – Board & Chalk
3	**Find alg- Collapsing rule**	**50 min**	**T1**	Lecture method – Board & Chalk
4	**Spanning trees**	**50 min**	**T1**	Lecture method – Board & Chalk
5	**Connected Components**	**50 min**	**T1**	Lecture method – Board & Chalk
6	**biconnected components.- Articulation Point**	**50 min**	**T1**	Lecture method – Board & Chalk

On completion of this lesson the student shall be able to

1. Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.
2. Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.
3. Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.

	ASSIGNMENT **Unit-II**	2013-14
		Regulation: R12

Assignment / Questions

1. Define Spanning tree?
2. Define articulation Point ,Describe algortithm for Biconnected componenets
3. Explain Weighted Union by rank and Collapsing find rule

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN **Unit-III**	2013-14 Regulation: R12

Name of the Faculty: **M.NAVEEN BABU**

Subject Design and Analysis of Algorithms Subject Code 54016

Unit III

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	**Divide and conquer: General method.**	50 min	T1	Lecture method – Board & Chalk
2,3	**Binary search**	1hr.40 min	T1	Lecture method – Board & Chalk
4,5	**Quick sort**	1hr.40 min	T1	PPT,Lecture method
6,7	**Merge sort**	1hr.40 min	T1	PPT,Lecture method
8,9	**Strassen's matrix multiplication.**	1hr.40 min	T1	PPT,Lecture method

On completion of this lesson the student shall be able to(Outcomes)

1. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
2. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms.
3. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.

	ASSIGNMENT **Unit-III**	2013-14 Regulation: R12

Assignment / Questions

1. Write the algorithm for Quick Sort & Explain through an example.
2. Analyze all cases of quick sort.
3. Explain & analyze the Marge sort algorithm.
4. Discuss the problem of selection & compare the time complexity of all type.
5. Explain the idea of strassen's matrix multiplication & write its's complexity.
6. Write the algorithm for binary search & analyze it.
7. Derive mathematically the time complexity of binary search tree.
8. Illustrate the divide and conquer strategy for finding maximum and minimum from a set of element.
9. Analyze all cases of time complexity for finding maximum and minimum from a set of element.
10. Two sets A and B each. Assume that each element is an integer in the range $[0,n^{100}]$. These sets are not necessarily sorted. Show how to check whether these two sets are disjoint in O(n) time. Your algorithm should use O(n) space.
11. Sort the follwing list in decending order using quick sort technique and argue upon its running time.
    a. L=<1,3,5,6,8,10,13,15>

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN Unit-IV	2013-14
		Regulation: R12

Name of the Faculty: **M.NAVEEN BABU**

Subject Design and Analysis of Algorithms Subject Code 54016

Unit IV

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	**Greedy method: General method**	**50 min**	**T1**	Lecture method – Board & Chalk
2,3	**applications-Job sequencing with dead lines**	**1hr 40 min**	**T1**	Lecture method – Board & Chalk
4,5	**0/1 knapsack problem**	**1hr 40 min**	**T1**	PPT,Lecture method
6,7	Minimum cost spanning trees,	**1hr 40 min**	**T1**	PPT,Lecture method
8	**Single source shortest path problem.**	**50 min**	**T1**	PPT,Lecture method

On completion of this lesson the student shall be able to (Outcomes)

1. Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
2. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.

3.Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.

	ASSIGNMENT **Unit-IV**	2013-14 Regulation: R12

Assignment / Questions

1. What do you mean Greedy Method. How it is useful to solve the algorithm.
2. Write algorithm for job sequencing problem so that all jobs are completed in deadline.
3. Let G(V,E) be any weighted connected graph. If C is any cycle of G, then show that the heaviest edge of C cannot belong to a minimum-cost spanning tree of G.
4. What is an MST? Write an algorithm for MST? Analyze it's Time Complexity.
5. Write Kruskal's algorithm & analyze it.

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN Unit-V	2013-14
		Regulation: R12

Name of the Faculty: **M.NAVEEN BABU**

Subject Design and Analysis of Algorithms Subject Code 54016

Unit V

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	**Dynamic Programming: General method**	**50 min**	**T1**	PPT ,Lecture method
2,3	**applications-Matrix chain multiplication**	**1hr 40 min**	**T1**	PPT ,Lecture method
4,5	**Optimal binary search trees**	**1hr 40 min**	**T1**	PPT ,Lecture method
6	0/1 knapsack problem	**50 min**	**T1**	PPT ,Lecture method
7	**All pairs shortest path problem**	**50 min**	**T1**	PPT ,Lecture method
8	**Travelling sales person problem,**	**50 min**	**T1**	PPT ,Lecture method
9	**Reliability design.**	**50 min**	**T1**	PPT ,Lecture method

On completion of this lesson the student shall be able to (Outcomes)

1) Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
2) Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.

	ASSIGNMENT **Unit-V**	2013-14 Regulation: R12

Assignment / Questions

1. Write the general method for Dynamic programming.
2. State the all pairs shortest path problem & analyze its Time & Space complexity.
3. Solve the all pairs shortest problem for the diagraph with the weight matrix

i.	| 0	2	∞	1	8 |
ii.	| 6	0	3	2	∞ |
iii.	| ∞	∞	0	4	∞ |
iv.	| ∞	∞	2	0	3 |
v.	| 3	∞	∞	∞	0 |

4. Taking the Traveling saleman problem as case study, suggest an algorithm for this & analyze its time complexity.

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN **Unit-VI**	2013-14 Regulation: R12

Name of the Faculty: **M.NAVEEN BAABU**

Subject Design and Analysis of Algorithms Subject Code 54016

Unit VI

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	**Backtracking: General method**	**50 min**	**T1**	PPT ,Lecture method
2,3	**applications-n-queen problem**	**1 hr 40 min**	**T1**	PPT ,Lecture method
4	**sum of subsets problem**	**50 min**	**T1**	PPT ,Lecture method
5	graph coloring	**50 min**	**T1**	PPT ,Lecture method
6	**Hamiltonian cycles**	**50 min**	**T1**	PPT ,Lecture method

On completion of this lesson the student shall be able to (Outcomes)

1. Explain the major graph algorithms and their analyses.
2. Employ graphs to model engineering problems, when appropriate.
3. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them

	ASSIGNMENT **Unit-VI**	2013-14 Regulation: R12

Assignment / Questions

1. State the 8-queens problem. Explain a back tracking algorithm for solving it.
2. State and solve 8-puzzle using backtracking.
3. Write an algorithm for sum of subsets & analyze it.
4. Suppose you are given n men and n women and two nxn arrays P and Q such that P(i,j) is the preference of man i for woman j and Q(i, j) is the preference of woman I for man j. Devise an algorithm that finds a pairing of men and women such that the sum of the product of the preference maximized.
5. Prove that the size of the set of all subsets of n elements is 2^n
6. Let w={5,7,10,12,15,18,10} and m=35. Find all possible subsets of w that sum to m. Draw the state space tree for it.

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN Unit-VII	2013-14
		Regulation: R12

Name of the Faculty: **M.NAVEEN BABU**

Subject Design and Analysis of Algorithms Subject Code 54016

Unit VII

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	**Branch and Bound: General method**	**50 min**	**T1**	PPT ,Lecture method
2,3	**applications - Travelling sales person problem**	**1hr 40 min**	**T1**	PPT ,Lecture method
4	**0/1 knapsack problem**	**50 min**	**T1**	PPT ,Lecture method
5	LC Branch and Bound solution	**50 min**	**T1**	PPT ,Lecture method
6	**FIFO Branch and Bound solution**	**50 min**	**T1**	PPT ,Lecture method

On completion of this lesson the student shall be able to

1. Explain the major graph algorithms and their analyses.
2. Employ graphs to model engineering problems, when appropriate.
3. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.

	ASSIGNMENT **Unit-VII**	2013-14 Regulation: R12

1) What do you mean by Branch & Bound & how it is differ from other method.
2) Write difference between FIFO branch and bound and LC branch and bound algorithms.
3) Devise algorithm for the knapsack problem using Branch and Bound Technique.
4) Devise algorithm for the traveling salesman problem using Branch and Bound Technique.
5) Consider the following traveling salesman instance defined by the cost matrix

a.	∞	7	3	12	8
b.	3	∞	6	14	9
c.	5	8	∞	6	18
d.	9	3	5	∞	11
e.	18	14	9	8	∞

   b. Obtain the reduced cost matrix.

6) Draw the state space tree generated by LCBB for the following knapsack instances:
   a. n=5, (p1,p2,…….,p5)=(10,15, 6, 8, 4), (w1, w2,…….,w5)=(4, 6, 3, 4, 2), and m=12
   b. n=5, (p1,p2,…….,p5)=(w1, w2,…….,w5)=(4, 4, 5, 8, 9), and m=15

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN **Unit-VIII**	2013-14 Regulation: R12

Name of the Faculty: **M.NAVEEN BABU**

Subject Design and Analysis of Algorithms Subject Code 54016

Unit VIII

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	**NP-Hard and NP-Complete problems**	**50 min**	**T1**	PPT ,Lecture method
2	**Basic concepts**	**50 min**	**T1**	PPT ,Lecture method
3	**non deterministic algorithms**	**50 min**	**T1**	PPT ,Lecture method
4,5	NP - Hard and NP Complete	**1 hr 40 min**	**T1**	,Lecture method
6	**Cook's theorem**	**50 min**	**T1**	,Lecture method

On completion of this lesson the student shall be able to

1. Compare between different data structures. Pick an appropriate data structure for a design situation.
2. Explain what an approximation algorithm is, and the benefit of using approximation algorithms.. Analyze the approximation factor of an algorithm.

	ASSIGNMENT **Unit-VIII**	2013-14 Regulation: R12

Assignment / Questions

1) Explain the concept of NP. Explain NP – completeness & satisfiability.
2) Write an algorithm for Random Number Generations & write at least two application of Random Number.
3) State cook's theorem.

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Note: Mention for each question the relevant objectives and outcomes.