JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech I Semester Examinations, January - 2018
ADVANCED ALGORITHMS
(Computer Science and Engineering)

Time: 3hrs
Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

5 × 5 Marks = 25

1.a) What is the smallest value of n such that an algorithm whose running time is $100 n^2$ runs faster than an algorithm whose running time is 2^n on the same machine? [5]

b) Show that if a node in a binary search tree has two children, then its successor has no left child and its predecessor has no right child. [5]

c) Enumerate the sequence of steps followed in designing a Greedy Algorithm. [5]

d) Write a short note on the DFS algorithm. [5]

e) Write a short note on the clique problem. [5]

PART - B

5 × 10 Marks = 50

2. Explain in detail about various kinds of Asymptotic Notations. [10]

OR

3.a) Write pseudo code for Strassen's algorithm.

b) Explain how hiring problem is analyzed using indicator random variables. [5+5]

4. What is a Binary Tree? Explain the process of insertion and deletion of elements into Binary Tree. [10]

OR

5.a) Explain in detail the following queries supported by Binary Search Trees.
i) MINIMUM and MAXIMUM   ii) SUCCESSOR and PREDECESSOR.

b) Explain how to implement RB-INSERT efficiently if the representation for redblack trees includes no storage for parent pointers. [5+5]

6.a) What is the total cost of executing n of the stack operations PUSH, POP and MULTIPOP, assuming that the stack begins with s_0 objects and finishes with s_n objects?

b) Explain in detail how Dynamic Programming is used for Optimal Rod cutting. [5+5]

OR

7. What are Huffman Codes? Explain the process of constructing a Huffman code with an example. [10]

8.a) Explain the implementation of Breadth-First algorithm with a neat example.

b) Let G = (V, E) be a bipartite graph with vertex partition V = L U R, and let G' be its corresponding flow network. Give a good upper bound on the length of any augmenting path found in G' during the execution of FORD-FULKERSON. [5+5]

OR

9. Explain the implementation of Kruskal's and Prim's algorithm with same example.[10]

10. Explain in detail about the subset sum problem with an example. [10]

OR

11. Explain in detail about
a) 3-CNF satisfiability
b) Formula satisfiability. [5+5]

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