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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATION- JUNE -2016

B.Tech IVth Semester

COURSE CODE: 10B11CI411 MAX. MARKS: 35

COURSE NAME: Fundamentals of Algorithms

COURSE CREDITS: 04 MAX. TIME: 2 HRS

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

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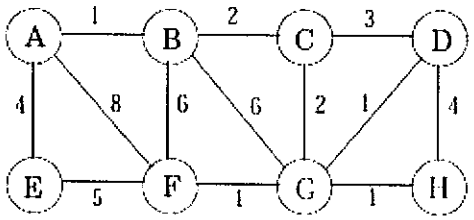
1. Suppose we want to find the minimum spanning tree of the following graph.



   (a) Run Prim's algorithm, whenever there is a choice of nodes, always use alphabetic ordering (e.g., start from node A). Draw a table showing the intermediate values of the priority queue.

   (b) Run Kruskal's algorithm on the same graph. Show how the disjoint-sets data structure looks at every intermediate stage (including the structure of the directed trees). Marks [3+3]

2. A subsequence is palindromic if it is the same whether read left to right or right to left. For instance, the sequence A,C, G, T, G, T,C, A, A, A, A, T,C,G has many palindromic subsequences, including A,C, G,C,A and A, A, A,A (on the other hand, the subsequence A,C, T is not palindromic). Devise an O (n^2) algorithm to extract the longest palindromic subsequence from the above sequence. Marks [6]

3. Find the minimum no of operations required for the chain matrix multiplication of AxBxCxD using dynamic programming.
   A: 30x40, B: 40x5, C: 5x15, D: 15x6. Marks [6]

4. Explain pattern matching problem. Write two algorithms one brute force and another fingerprint/hash based to solve a pattern matching problem also compare their complexities. Marks [1+2+2]

5. What is a Knapsack problem? Explain with an example the dynamic programming solution of a Knapsack problem and also mention the complexity. Marks [2+3+1]

6. Define NP-class of problem. Explain, weather, P ϵ NP? Define NP-Complete problems. Marks [2+2+2]