BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI (MID SEMESTER EXAMINATION)

CLASS: IMSc SEMESTER: IV BRANCH: MATHS & COMP. SESSION: SP/2019

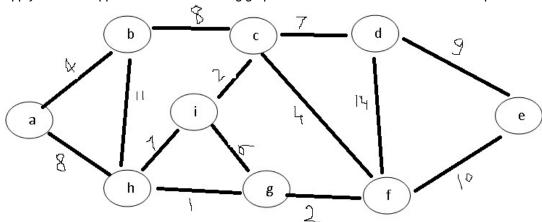
SUBJECT: CS6101 DESIGN AND ANALYSIS OF COMPUTER ALGORITHM

TIME: 1.5 HOURS FULL MARKS: 25

INSTRUCTIONS:

- 1. The total marks of the questions are 30.
- 2. Candidates may attempt for all 30 marks.
- 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
- 4. Before attempting the question paper, be sure that you have got the correct question paper.
- 5. The missing data, if any, may be assumed suitably.

- Q1 (a) What is algorithm? Discuss the different distinct areas of study in algorithm. [2]
 (b) Explain the following notation. [3]
 - (a)Big -O (b) theta (c) omega
- Q2 (a) Consider the following functions: $f(n) = 3 n^{\sqrt{n}}$, $g(n) = 2^{\sqrt{n} \log n}$, h(n) = n!. which is the following [2] is true show step.
 - (a) h(n) is o f(n) (b) h(n) is o(g(n) (c) g(n) is not o(f(n)) (d) f(n) is o(g(n)).
 - (b) Prove that if $f(n) = a_m n^m + \dots a_1 n + a_0$, then $f(n) = O(n^m)$ [3]
- Q3 (a) Apply master theorem to find the solution of the given recurrence: $T(n) = TT(n/2) + 18 n^2$, $n \ge 2$ and a power of 2.
 - (b) Suggest algorithm binary search using divide and conquer approach. [3]
- Q4 (a) Assume that a merge sort algorithm in the worst case takes 30 seconds for an input of size 64. [2] Find the most closely approximates the maximum input size of a problem that can be solved in 6 minutes?
 - (b) Show that average computing time of select (finding kth smallest element) is O(n). [3]
- Q5 (a) What is greedy algorithm? [2]
 - (b) Find the optimal solution to the knapsack instance n= 3, C=300(capacity), (p1,p2,p3)=(5,5,4) and [3] (w1, w2, w3)=(120,150,200).
- Q6 (a) Differentiate between prim's and kruskals's algorithm. [2]
 - (b) Apply kruskal's approach for the following graph and find MST and cost. Show the steps. [3]



:::::: 08/03/2019 :::::E