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

CLASS: BE
BRANCH: CSE

SEMESTER : III
SESSION : MO/17

SUBJECT: CS6101 DESIGN AND ANALYSIS OF COMPUTER ALGORITHMS

TIME: 3. Hours

FULL MARKS: 60

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) What is the maximum number of activation records that will reside on the run time stack of a computer executing power2(2,16) and power1(2,16)? [2]

Q.1(b) Solve the recurrence using Master Theorem $T(n)= 9n/10+n^2$. [4]

Q.1(c) Using definition of asymptotic notation prove that $\lg n!=\Omega(n\lg n)$ [6]

Q.2(a) FIND-MAXIMUM-SUBARRAY is a function which returns a maximum. What does this function will return if all the elements of Array are negative? [2]

Q.2(b) Find the solution asymptotically for $T(n)= T(n-1) +n$. [4]

Q.2(c) Find an asymptotically lower bound for sorting. [6]

Q.3(a) List two properties for greedy choice. [2]

Q.3(b) Write an algorithm for Job sequencing with deadline and analyze its time complexity asymptotically. [4]

Q.3(c) Give a dynamic programming solution to the 0-1 knapsack problem that runs in O(nW) time. Where n is the number of items and W is the maximum weight of items that the thief can put in his knapsack. [6]

Q.4(a) Memorization/Momoization is Dynamic programming principle. Agree or Disagree. Justify your answer. [2]

Q.4(b) Write the algorithm for Traveling sales problem and analyses its time complexity. [4]

Q.4(c) Find a minimum cost path from s to t in the multistage graph of the following figure. Write the computational function for finding the minimum cost path. [6]
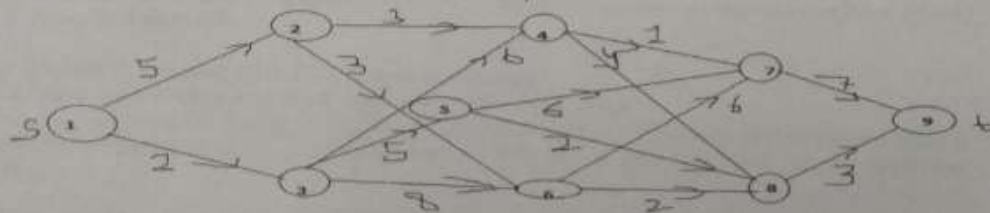
Q.5(a) Write the number of squares in an 8 X 8 Chess board. Placing of queens are directly proportional to number squares in the chess board. Justify your answer. [2]

Q.5(b) List the four factors according to you, on which the efficiency of Back tracking depends. [4]

Q.5(c) Write an algorithm for sum of subsets and analyze its time complexity asymptotically. [6]

Q.6(a) Explain LC search for branch and bound. [2]

Q.6(b) What is solution space? Proposed a strategy for pruning the solution space in branch and bound method. [4]

Q.6(c) Propose an algorithm for any Puzzle problem. Explain the proposed algorithm with an working example. [6]

Q.7(a) Write short notes on Satisfiability. [2]

Q.7(b) Explain AOG graph with an example. [4]

Q.7(c) Prove that 3CNF is a NP Problem. [6]

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