

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

**CLASS: MCA
BRANCH: MCA**

**SEMESTER : III
SESSION : MO/18**

**SUBJECT: MCA3005 FUNDAMENTAL OF COMPUTER ALGORITHMS
TIME: 3.00 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.
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- Q.1(a) Distinguish between algorithm and pseudocode? Describe the difference between average and worst-case analysis of an algorithm with an example? [6]
- Q.1(b) What do you mean by conditional asymptotic notation? Discuss asymptotic notation with several parameters? [6]
- Q.2(a) What is amortized analysis of algorithm and explain how is it different from asymptotic analysis? [6]
- Q.2(b) What do you mean by performance analysis? Explain recursive functions algorithm analysis with an example? [6]
- Q.3(a) Find the optimal solution to the knapsack instance $n = 7$ objects and the capacity of knapsack $m = 15$. The profits and weights of the objects are $(P_1, P_2, P_3, P_4, P_5, P_6, P_7) = (10, 5, 15, 7, 6, 18, 3)$ $(W_1, W_2, W_3, W_4, W_5, W_6, W_7) = (2, 3, 5, 7, 1, 4, 1)$. [6]
- Q.3(b) Discuss the single-source shortest paths algorithm with suitable example? [6]
- Q.4(a) Write divide and conquer recursive quick sort algorithm and analyze the algorithm for average time complexity? [6]
- Q.4(b) What is the difference linear search and binary search? Explain recursive binary search algorithm with suitable examples? [6]
- Q.5(a) Explain how matrix chain multiplication problem can be solved using dynamic programming with suitable example? [6]
- Q.5(b) Describe the dynamic 0/1 knapsack problem? [6]
- Q.6(a) Discuss the 4-queens' problem? Draw the portion of the state space tree for $n = 4$ queens using backtracking algorithm? [6]
- Q.6(b) Compare BFS and DFS algorithm with an example graph and denotes its time complexity? [6]
- Q.7(a) What is the difference between expected and average time? Discuss monte carlo probabilistic algorithms? [6]
- Q.7(b) Discuss numerical probabilistic algorithms? [6]

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