

Time: 3 Hours

Max. Marks: 80

N.B.:

- (1) Question No. 1 is compulsory.
- (2) Attempt any three out of the remaining five questions.
- (3) Assumptions made should be clearly stated.

Q1. Solve any Four questions out of Five.

5 marks each

- A Sort the following numbers using Quick sort: 50, 31, 71, 38, 77, 81, 12, 33.
- B Build a max heap H from the given set of numbers: 45, 36, 54, 27, 63, 72, 61 and 18. Also draw the memory representation of the heap.
- C Compute prefix function for the pattern: ababaca.
- D Explain 0/1 knapsack problem using dynamic programming
- E What is Complexity? Explain in detail asymptotic notations.

Q2. Solve the following

10 marks each

- A Create a B tree of order 5 by inserting the following elements:
3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, and 19.
- B Find out the time complexity for the recurrence equation as follows:
 - a) $T(n) = T(n/2) + 1$
 - b) $T(n) = 2T(n/2) + n$

Q3. Solve the following

10 marks each

- A Write short note on master theorem.
- B Explain greedy strategy of designing algorithm.

Q4. Solve the following

10 marks each

- A Analyze Time complexity of Binary Search using Divide and Conquer. Also write the algorithm for the same
- B Explain Matrix chain multiplication in detail.

Q5. Solve the following

10 marks each

- A Describe algorithm and complexity of all pair shortest path.
- B What is the sequence of job, for following sequence of job gives the snapshot of execution, which will achieve maximum profit.

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|----------|----|----|----|---|---|---|
| job | 1 | 2 | 3 | 4 | 5 | 6 |
| profit | 20 | 15 | 10 | 7 | 5 | 3 |
| deadline | 3 | 1 | 1 | 3 | 1 | 3 |

Q6. Solve the following

10 marks each

- A Explain the Knuth-Morris-Pratt algorithm (KMP).
- B Explain Genetic algorithms in detail.
