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.

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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.

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.

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