

T.E. IN FT SEM V C-Scheme June 2026

Time: 3 Hours

Marks: 80

N.B.

12/06/26

1. Q.1 is compulsory
2. Attempt any three from remaining five questions
3. Figures to write indicates full marks
4. Assumptions made should be clearly stated.

Q.1 Answer the following (Any 4)

- a. Explain vertex cover problem? Explain algorithm with the suitable example. 5
- b. Sort the following elements using merge sort 10,5,7,6,1,4,8,3,2,9 5
- c. What is Complexity? Explain asymptotic notations in detail 5
- d. Explain Boyer-Moore String matching algorithm with example. 5
- e. Write the principal of optimality, differentiate between greedy method and dynamic programming. 5

Q.2 a. Construct a B⁺ tree of order 3 for the given elements 10
F, S, Q, K, C, L, H, T, V, W, M, R

b. Describe, with an example KMP algorithm. Also comment on complexity. 10

Q.3 a. For a directed graph, the edge length matrix is given below. Solve the Travelling Salesperson Problem for the graph using dynamic programming method. 10

	1	2	3	4
1	0	9	8	8
2	12	0	13	6
3	10	9	0	5
4	20	15	10	0

b. Write an algorithm for quick sort and explain its time complexity. 10

Q.4 a. Using algorithm determine longest common subsequence of (A, B, C, D, B, A, C, D, F) and (C, B, A, F) 10

b. What is Max and Min Heap? Explain Heapify. Write the time complexity of the Heap sort. 10

Q.5 a. Solve the following recurrence relation using Master Theorem 10

a. $T(n) = 2T(n/2) + n \log n$

b. $T(n) = 8T(n/2) + n^2$

b. Solve the following knapsack problem using dynamic programming for $n=3$, $[w_1, w_2, w_3] = [1, 2, 2]$ and $[p_1, p_2, p_3] = [18, 6, 6]$ and $M=4$. 10

Q.6. Solve the following (Any two) 20

- a. Rabin Karp Algorithm
- b. Red- Black Tree
- c. Matrix Chain Multiplication Problem
- d. Genetic Algorithm with Flow Chart