SECTION–A

1. Attempt all parts of the following : 8×1=8

   (a) What is an algorithm? What is the need to study algorithms?

   (b) Differentiate between quick sort and merge sort.

   (c) Define binary search technique.

   (d) Define greedy algorithm.

(e) What is Hamiltonian path?

(f) Define single source shortest path.

(g) Give the formula for LCS.

(h) Define graph.

SECTION – B

2. Attempt any two parts of the following : 2×6=12

(a) Give the insertion sort algorithm and analyze the efficiency.

(b) Short the following numbers using quick sort method :

6, 1, 9, 3, 4, 8, 2, 7

(c) Explain Strassen's matrix multiplication with an example.

(d) Explain DFS graph traversal algorithm with an example.

SECTION – C

Note :– Attempt all questions. Attempt any two parts from each questions. 8×5=40

3. (a) Find the big theta notation for the function :

$$f(n) = n^2 + 5n + 2^n + 2$$

giving the values of n_0 and c.

(b) Using heap sort algorithm sort the following array :

A = {36, 15, 90, 1, 60, 20, 55, 25, 50, 20}

(c) Explain bubble sort with example.

4. (a) Define kanpsack problem. Find an optimal solution to the knapsack instance n = 6, M = 15, $(P_1, P_2, P_3, P_4, P_5, P_6) = (15, 16, 7, 6, 18, 3)$ and $(w_1, w_2, w_3, w_4, w_5, w_6) = (2, 3, 5, 7, 14, 1)$ using greedy approach.

(b) Create a Huffman tree for the following set of data :

Characters	a	b	c	d	e	f
Frequency	48	11	9	14	7	3

and give the decoding of the following strings :

(i) 11100000000011111010101010101

(ii) 10101010101010101010101010101

(c) Explain activity selection problem with example.

5. (a) Solve the sum of subset problem using back-tracking algorithmic strategy for the following data :

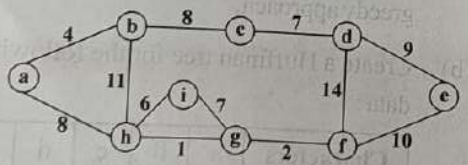
$N = (11, 13, 24, 7)$ and $M = 31$

(b) Determine an LCS of :

{1, 0, 0, 1, 0, 1, 0, 1} and {0, 1, 0, 1, 1, 0, 1, 1, 0}

(c) Define N-queen problem. Find all solutions of 4-queen problem.

6. (a) Find the minimum cost spanning tree using prim's algorithm :



(b) Explain the Dijkstra's algorithm for finding single source shortest path with example.

(c) Find the solution of the assignment problem using branch and bound method of the following problem :

$C =$

	J_1	J_2	J_3
A	4	7	3
B	2	6	1
C	6	9	4

Where C is the cost matrix :

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