

UNIT - I

1. Give asymptotic upper bound or lower bound on each of the following recurrences. Assume that $T(n)$ is constant and make your bound as tight as possible. Justify your answer (any four).
- (i) $T(n) = 3T(n/2) + n \log n$ (ii) $T(n) = 5T(n/5) + n/n \log n$
 (iii) $T(n) = 4T(n/2) + n^2 \sqrt{n}$

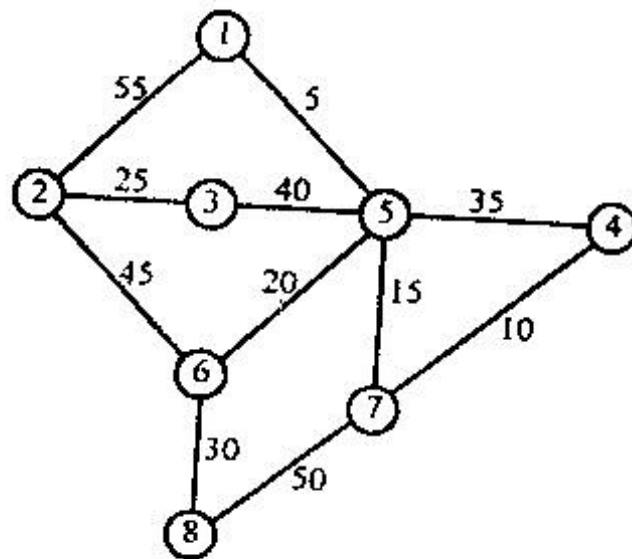
(iv) $T(n) = 3T\left(\frac{n}{3} + 5\right) + n/2$

(v) $T(n) = T(n - 2) + 2 \log n$

(4 × 4 = 16)

OR

2. (a) Trace the Kruskal's algorithm to obtain minimum spanning tree from the graph. (10)



- (b) Illustrate the operation of heap on following array:
 $A = \langle 5, 13, 2, 25, 7, 17, 20, 8, 4 \rangle$ (6)

UNIT - II

3. (a) Define how Knapsack problem is solved by using dynamic programming approach? (6)

- (b) Consider $n = 3$. $(w_1, w_2, w_3) = (2, 3, 3)$, $(p_1, p_2, p_3) = (1, 2, 4)$ and $m = 6$. Find optimal solution for given data. (10)

OR

4. (a) $X = \langle a, a, b, a, b \rangle$, $Y = \langle b, a, b, b \rangle$. If Z is an LCS of X and Y , then find Z using dynamic programming. (8)

- (b) Solve the TSP problem having the following cost matrix using branch and bound.

	A	B	C	D
A	X	5	2	3
B	4	X	2	3
C	4	2	X	3
D	7	6	8	X

(8)

UNIT – III

5. Given the text

$$T = \langle 2, 3, 5, 9, 0, 2, 3, 1, 4, 1, 5, 2, 6, 7, 3, 9, 9, 2, 1 \rangle$$

$$P = \langle 3, 1, 4, 1, 5 \rangle$$

And modulo $q = 13, m = 5$

Choose the pattern matching with average case complexity and explain the search process. Justify the answer for choosing such algorithm. (5 + 8 + 3)

OR

6. (a) Write short note on the following:

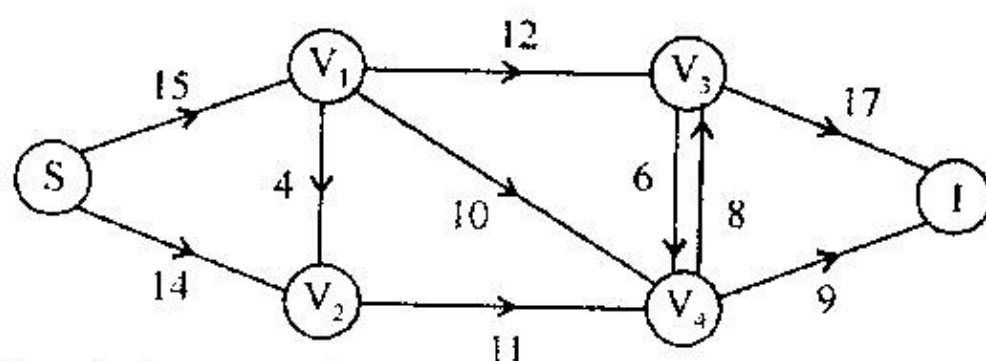
(i) Quadratic Assignment Problem.

(ii) Bi-quadratic Assignment Problem. (4 × 2 = 8)

(b) What is the use of prefix function in KMP string matching algorithm. Explain with example. (8)

UNIT – IV

7. (a) Define flow networks and solve the following flow network for maximum flow : (12)

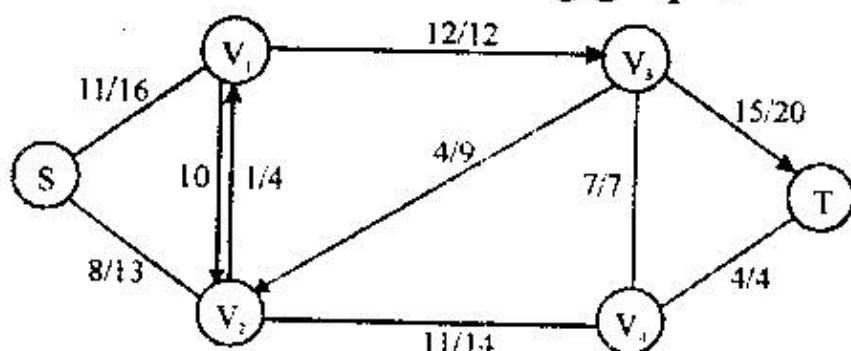


(b) Explain Randomized algorithm for min-cut. (4)

OR

8. (a) Solve the randomized algorithm N – Queens problem. (8)

(b) Show the formation of cuts, Augmentation path, Min-flow-max-cut in the following graph. (8)



UNIT – V

9. (a) Assuming 3 – CNF satisfiability problem to be NP- complete, prove clique problem is also NP – complete. (10)

(b) Explain the Cook's theorem with suitable example. (6)

OR

10. (a) Show that TSP is NP complete. (8)

(b) Explain vertex and set cover problem. (8)