Total number of printed pages–4

53 (IT 504) DAAL

2018

DESIGN AND ANALYSIS ALGORITHM

Paper : IT 504

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* Explain with suitable example, the principal operation of Quick Sort. 10

   (b) Find the Best Case and Worst Case complexity of quick sort algorithm. 10

2. *(a)* Write an algorithm for Merge Sort. 10

Contd.

(b) Show how merge sort will sort the following element : 10

100,90,20,70,30,80,40,60,50.

3. (a) Define Big O, Ω, $\ominus$ notation. 6

(b) Draw the recursive tree for the recurrence relation : 7

$$T(n) = T(n/3) + T(2n/3) + n$$

(c) Solve the recurrence relation : 7

$$T(n) = 2T(n/2) + 1, \quad T(1) = 1$$

4. Show steps of Kruskal's and Prim's algorithm to find a minimum spanning tree of the graph shown in *Figure 1.* 10+10

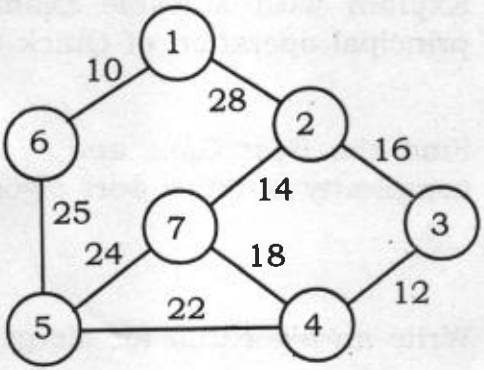
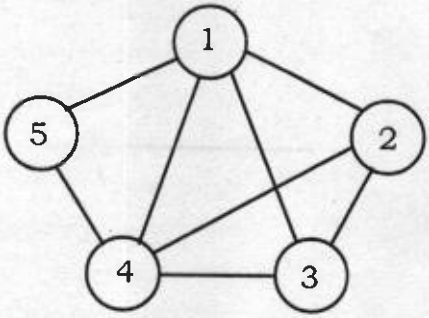


Figure 1

5. *(a)* Trace the steps to solve the 4–queen problem by backtracking method. For each step draw the 4×4 matrix showing the position of queens in it. Show where you apply backtracking. 10

(b) Apply backtracking technique to solve the 4–coloring problem for the following graph. 10



6. *(a)* Construct a Heap tree (Max) containing the following elements : 10

66, 33, 40, 20, 50, 88, 60, 11.

(b) Write the algorithm of matrix-chain multiplication. 10

7. Write short notes on : ***(any four)*** 5×4=20

(a) Knapsack problem

(b) NP-Hard and NP-Complete problems

(c) Depth-First-Search Algorithm

(d) Solution of TSP using Branch and Bound

(e) Hamiltonian cycles

(f) Graph coloring problem.