

Hall Ticket Number:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Code No.: 22504 S

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. II Year (I.T.) II-Semester (Supplementary) Examinations, December-2016

Design and Analysis of Algorithms

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Find the complexity for the following algorithm using step count method.

```
Algorithm add(a,b,c,m,n) {  
  for i:= 1 to n do  
    for j:=1 to n do  
      c[i,j]:=a[i,j]+b[i,j];  
    }  
}
```

2. Prove the following are correct.
i) $n^3 + 10^6n^2 = \theta(n^3)$ ii) $3n+3=\Omega(1)$
3. Write control abstraction for Divide and Conquer Approach.
4. Write any two applications of Huffman code.
5. Write algorithm for All-pair shortest path of a given graph.
6. Define bi-connected components, give an example.
7. Draw the comparison tree for sorting 3 elements.
8. What is a chromatic number?
9. Differentiate between NP-hard and NP-Complete problems.
10. List and define the functions of Nondeterministic algorithm.

Part-B (5 × 10 = 50 Marks)

11. a) What are the features of efficient algorithm? Explain. [4]
b) Write a recursive algorithm for Towers of Hanoi problem and trace the solution for three discs. [6]
12. a) Let $A = \begin{bmatrix} 1 & 3 & 1 \\ 2 & 1 & 2 \\ 3 & 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 1 & 2 \\ 3 & 2 & 1 \end{bmatrix}$ Compute $A \times B$ using Strassen's matrix multiplication. [7]
b) Explain minimum cost spanning tree with an example. [3]
13. a) Explain multi-stage graph problem with suitable example. [5]
b) Find the solution for the knapsack instance: $n=3, w_1=2, w_2=3, w_3=4, p_1=1, p_2=2, p_3=5$ and $m=6$ using dynamic programming approach. [5]

(P.T.O.)

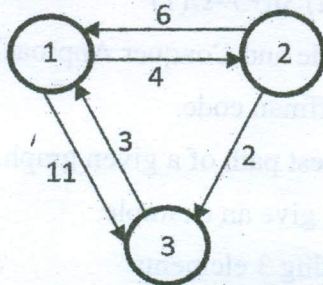
14. a) Explain how backtracking approach can be used to solve 8-Queen problem. [3]
 b) Construct solution space tree and reduced cost matrix for the following TSP problem [7]
 instance using LCBB.

$$\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$$

15. a) Prove that CNF- satisfiability is directly proportional to Clique decision problem. [5]
 b) Show that graph colouring is NP-Complete problem. [5]
16. a) Write an algorithm for Heap sort and discuss its complexity. [5]
 b) Find the optimal placement for 13 programs on three tapes T0, T1 and T2, where the programs are of lengths 12, 5, 8, 32, 7, 5, 18, 26, 4, 3, 11, 10 and 6. [5]

17. Answer any *two* of the following:

- a) Develop an all pair shortest paths problem for the given directed graph. [5]



- b) Differences between Backtracking and Branch & Bound [5]
 c) Prove that Node cover decision problem is NP complete. [5]

