



US – 654

VI Semester B.C.A. Examination, May 2017
(Y2K8 Scheme)
COMPUTER SCIENCE
BCA 601 : Design and Analysis of Algorithms

Time : 3 Hours

Max. Marks : 90/100

- Instructions :** 1) Section **A, B, C** are common to **all**.
2) Section **D** is applicable to the students who take admission in **2013-14**.
3) **100** marks for students of **2013-14** and **90** marks for repeaters prior to **2013-14**.

SECTION – A

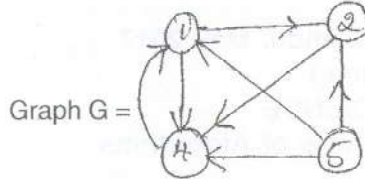
I. Answer **any ten** questions. **Each** carries **two** marks. (10×2=20)

- 1) What are the characteristics of an algorithm ?
- 2) Let $f(n) = 100n + 5$. Express $f(n)$ using Big-omega and Big-oh.
- 3) Arrange the following complexities in ascending order
 $O(n \log n)$ $O(n^3)$ $O(n)$ $O(n^2)$ $O(1)$.
- 4) Write the control abstraction for divide and conquer method.
- 5) What is knapsack problem ?
- 6) What is minimum spanning tree ?
- 7) What is flow shop scheduling ?
- 8) Define the terms :
 - i) Binary tree
 - ii) Complete Binary tree.
- 9) Write two possible solutions for 4-Queens problem.

P.T.O.



- 10) Write the adjacency matrix of the following graph.



- 11) What is Backtracking ?
 12) What is Graph coloring ?

SECTION – B

- II. Answer **any five** questions. **Each** carries **five** marks. (5×5=25)

- 13) Discuss Asymptotic notations.
- 14) Explain time and space complexity of an algorithm with example.
- 15) Write the advantages and disadvantages of divide and conquer technique.
- 16) Explain merge sort algorithm with an example.
- 17) What are the different strategies to solve knapsack problem. Mention its constraints.
- 18) Explain concept of dynamic programming. Differentiate between dynamic programming and greedy method.
- 19) Write recursive in-order and post-order tree traversal algorithms.
- 20) Compare depth first search and breadth first search.

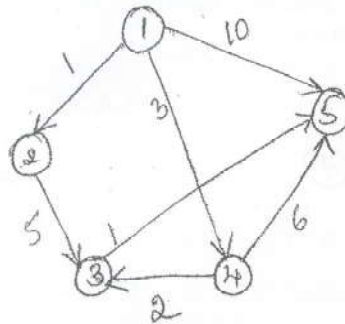
SECTION – C

- III. Answer **any three** questions. **Each** carries **fifteen** marks. (3×15=45)

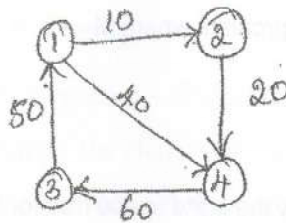
- 21) a) Write an algorithm for finding maximum and minimum using straight forward method and find the time complexity. 8
 b) Write binary search algorithm. 7
- 22) Write the algorithm for quicksort and trace for the data 45, 36, 15, 92, 35, 71.



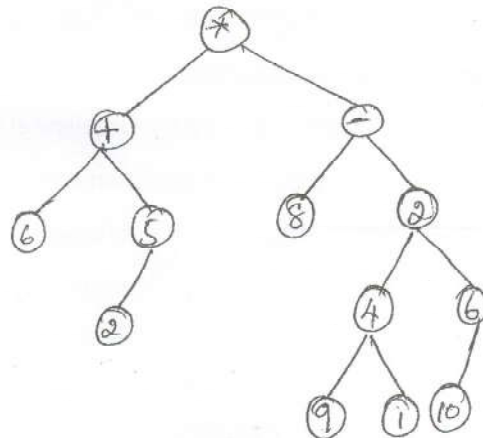
- 23) Find the shortest distance from node 1 to all other nodes using Dijkstra's algorithm for the following graph.



- 24) Write all pairs shortest path algorithm and determine the all pairs shortest paths for the weighted graph.

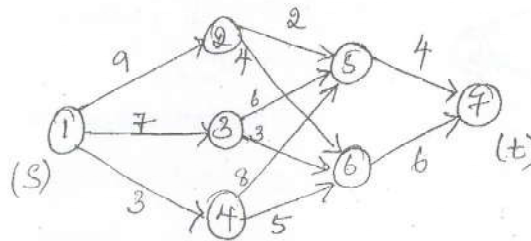


- 25) a) Define tree. Traverse the following tree in preorder, post-order and in-order.





- b) Find the minimum cost path for the below multistage graph using forward approach.



SECTION - D

IV. Answer **any one** question. Each carries **ten** marks.

(1×10=10)

- 26) Find the optimal solution to the greedy knapsack problem where $M = 40$, $N = 4$

Weights $[W_1, W_2, W_3, W_4] = [20, 25, 10, 15]$

Profits $[P_1, P_2, P_3, P_4] = (20, 40, 35, 45]$

Also find maximum profit earned.

- 27) Write control abstraction for Backtracking. Draw the state space tree for the graph with $n = 3$ vertices and $m = 3$ colors (Red, Blue and Green)

