



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

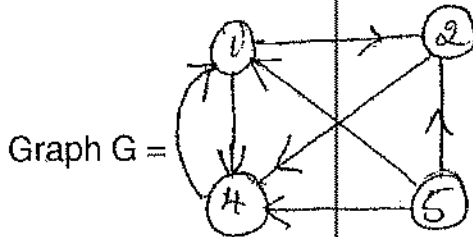
- I. Answer any ten questions. Each carries two marks. (10x2=20)
- 1) What are the characteristics of an algorithm ?
 - 2) Let $f(n) = 100n + 5$. Express $f(n)$ using Big-omega and Big-oh.
 - 3) Arrange the following complexities in ascending order
 $o(n \log n)$ $o(n^3)$ $o(n)$ $o(n^2)$ $o(1)$.
 - 4) 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.

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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)

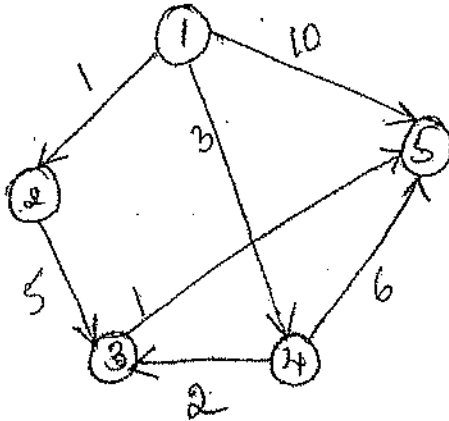
21) a) Write an algorithm for finding maximum and minimum using straight forward method and find the time complexity. 8

b) Write binary search algorithm. 7

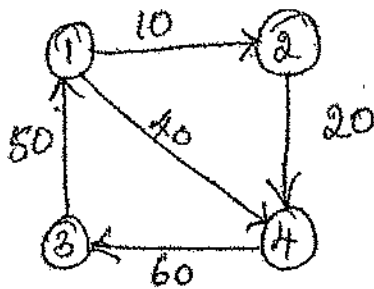
22) Write the algorithm for quicksort and trace for the data 45, 36, 15, 92, 35, 71.



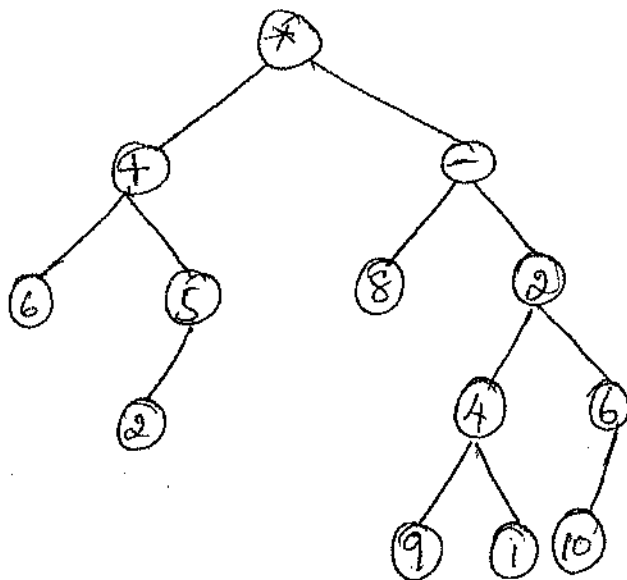
23) Find the shortest distance from node 1 to all other nodes using Dijkstra's algorithm for the following graph.



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



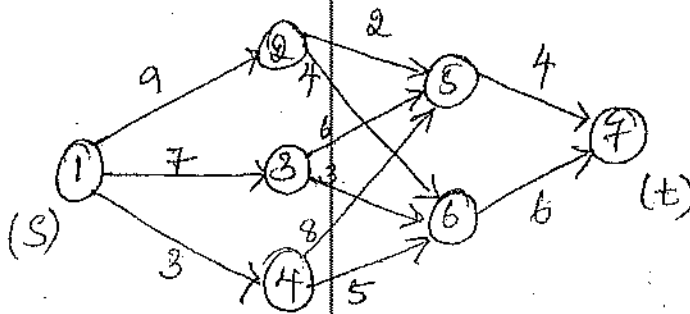
25) a) Define tree. Traverse the following tree in preorder, post-order and in-order.



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

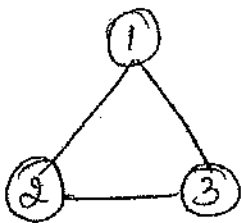


SECTION - D

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)



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