



VI Semester B.C.A. Degree Examination, May 2016  
(F + R) (Y2K8 Scheme)  
COMPUTER SCIENCE

BCA 601 : Design and Analysis of Algorithms  
100 Marks – 2013-14 and Onwards  
90 Marks – Prior to 2013-14

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 taken admission in 2013-2014.  
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) Define an algorithm. Mention the characteristics of an algorithm.
  - 2) Mention the best case, average case and worst case time complexities of linear search algorithm.
  - 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 time complexities of
    - i) Binary search
    - ii) Merge sort.
  - 5) Mention the best case, average case and worst case time complexities of quick sort algorithm.
  - 6) Write control abstraction of greedy method.
  - 7) What is cost adjacency matrix ?



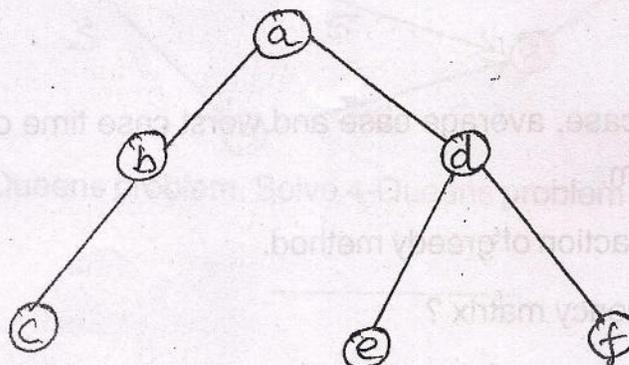
- 8) Define the terms
  - i) Binary tree
  - ii) Complete binary tree.
- 9) State fractional knapsack problem.
- 10) What is backtracking ?
- 11) Mention tree traversal methods.
- 12) What is graph coloring ?

## SECTION - B

II. Answer **any five** questions. **Each** carries **five** marks.

(5×5=25)

- 13) Illustrate asymptotic notations with examples.
- 14) Solve the following recurrence relation using substitution method  
 $T(n) = T(n - 1) + 2, T(1) = 0$
- 15) Write recursive maxmin algorithm to obtain maximum and minimum among N elements.
- 16) Write Kruskal's algorithm to obtain minimum cost spanning tree.
- 17) Write Floyd's algorithm and analyze its time complexity.
- 18) What is dynamic programming ? Mention its advantages.
- 19) State travelling salesperson problem. Mention its application.
- 20) Write recursive preorder tree traversal algorithm and traverse the following tree in preorder.





SECTION - C

III. Answer any three questions. Each carries fifteen marks. (3x15=45)

21) a) Obtain the time complexity of the code below : 7

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a = 0;
for i = 1 to n do
  for j = 1 to n - i do
    a = a + i * j;
  
```

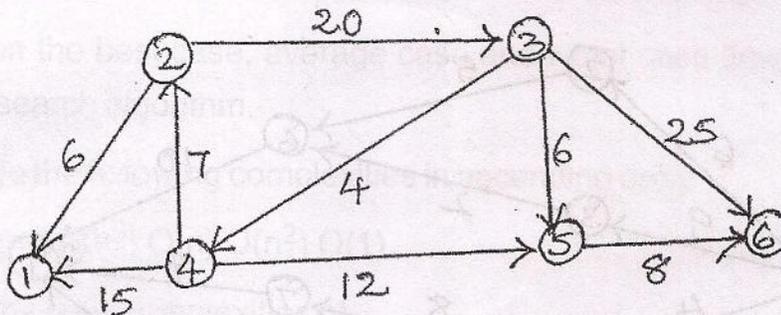
b) Draw and explain the state space tree for graph coloring when n = 3 and m = 3 (n is the number of vertices and m is the number of colors). 8

22) a) Write merge sort algorithm and analyze its time complexity. 8

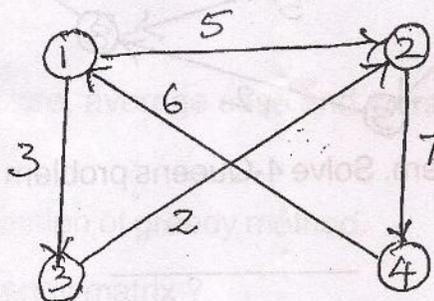
b) Trace the merge sort algorithm for following set of numbers : 7

22 -16 45 33 -7 60 -34 55

23) Find the shortest distance from node 3 to all other nodes using Dijkstra's algorithm in the following graph. 15



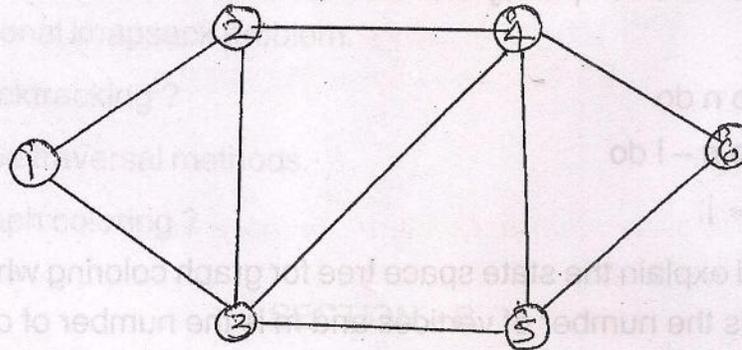
24) Solve all pairs shortest path problem for the below graph. 15





25) a) Differentiate between DFS and BFS algorithms.

b) Traverse the following graph using DFS.

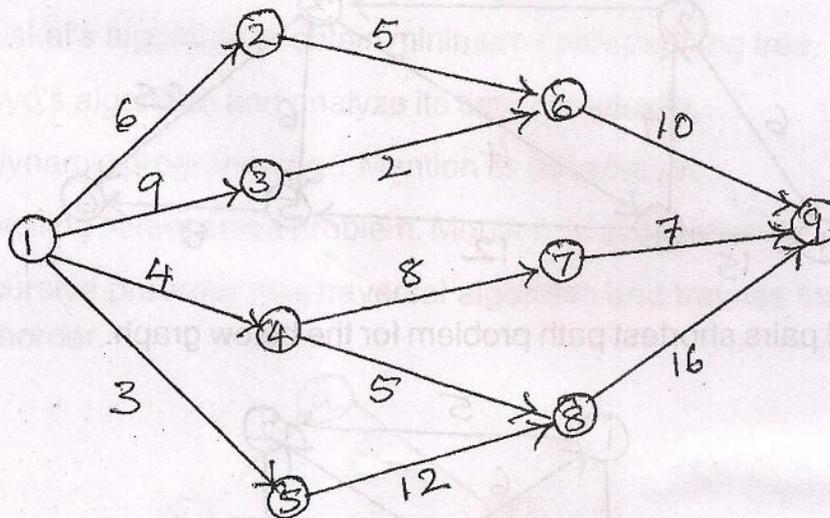


SECTION - D

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

(1×10=10)

26) Define multistage graph. Find minimum cost path from vertex 1 to vertex 9 in the following graph using forward approach.



27) State N-Queens problem. Solve 4-Queens problem using back tracking.

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