



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 ?



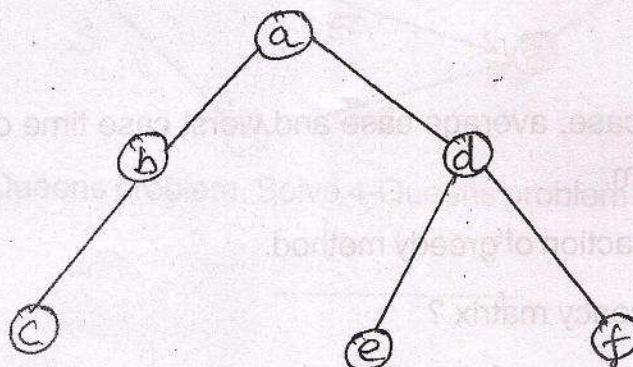
- 8) Define the terms
 - i) Binary tree
 - ii) Complete binary tree.
- 9) State fractional knapsack problem.
- 10) What is backtracking ?
- 11) Mention tree traversal methods.
- 12) What is graph coloring ?

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

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

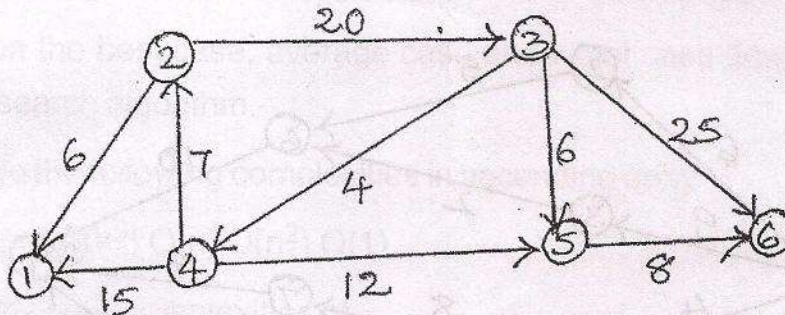
b) Draw and explain the state space tree for graph coloring when $n = 3$ and $m = 3$ (n is the number of vertices and m is the number of colors). 8

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

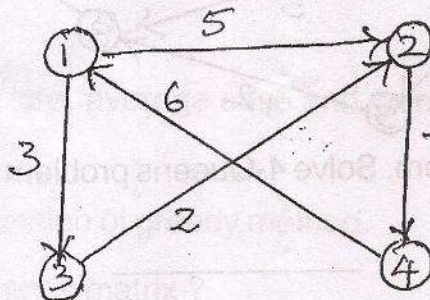
b) Trace the merge sort algorithm for following set of numbers : 7

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

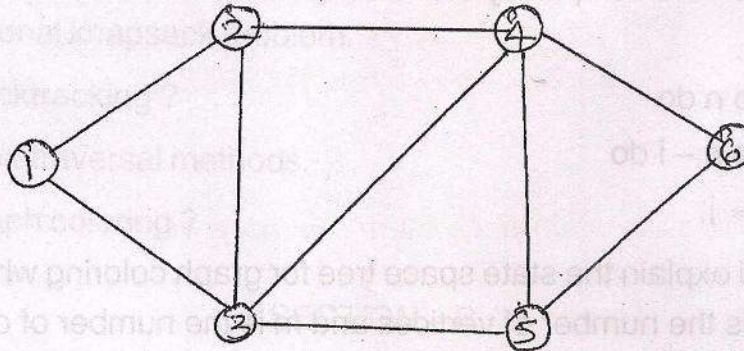


24) Solve all pairs shortest path problem for the below graph. 15





- 25) a) Differentiate between DFS and BFS algorithms.
 b) Traverse the following graph using DFS.

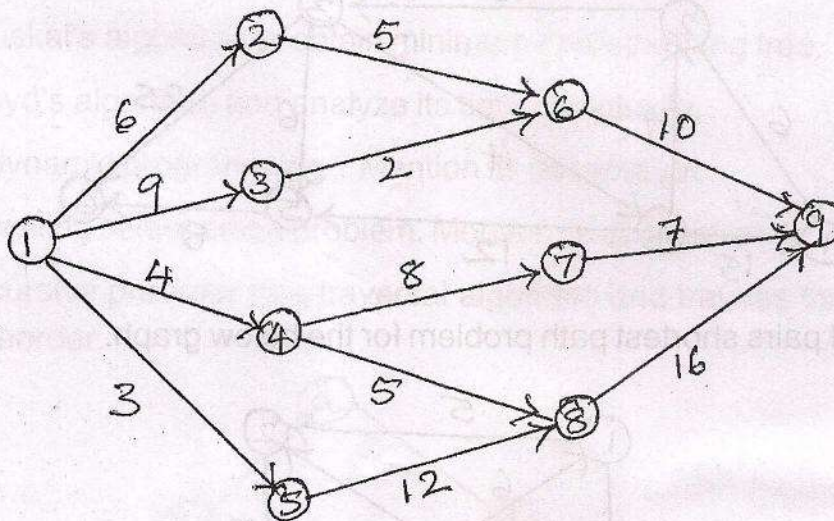


SECTION - D

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.
