

**E 3947**

(Pages : 3)

Reg. No.....

Name.....

**B.C.A. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2016**

**Third Semester**

Core Course—DESIGN AND ANALYSIS OF ALGORITHMS

(2013 Admission onwards)

Time : Three Hours

Maximum : 80 marks

**Part A (Short Answer Questions)**

*Answer all questions.*

*Each question carries 1 mark.*

1. What is an algorithm ?
2. Define order of an algorithm ?
3. Define divide and conquer method.
4. What are the constraints for knapsack problem ?
5. Explain Greedy method.
6. Define a spanning tree.
7. Explain backtracking.
8. Merge sort following : 9, 10, 4, 23, 5, 11, 2, 15.
9. What is Hamiltonian cycles ?
10. State Travelling Salesman Problem.

(10 × 1 = 10)

**Part B (Brief Answer Questions)**

*Answer any eight questions.*

*Each question carries 2 marks.*

11. What are the characteristics of a good algorithm ?
12. What do you mean by Amortized analysis ?
13. Write Binary search algorithm.
14. Define control abstraction.
15. Compute complexity for Binary search.
16. Explain different areas of algorithm study.

**Turn over**



17. Define feasible and optimal solution.
18. Write difference between Greedy method and dynamic programming.
19. List the applications of a binary tree.
20. Give the Time complexity and space complexity of TSP.
21. Write an algorithm to find the shortest-path of all pairs of edges in a graph.
22. How do you transform a graph into a bi-connected graph ?

(8 × 2 = 16)

**Part C (Descriptive/Short Essay Type Questions)**

*Answer any six questions.*

*Each question carries 4 marks.*

23. Why do we use asymptotic notation in the study of algorithm ? Describe commonly used asymptotic notations and give their significance.
24. Write an algorithm for finding solution to the Tower's of Hanoi problem. Explain the working of your algorithm (with 4 disks) with diagrams.
25. Write algorithm for Quick sort.
26. Which are the two standard ways of traversing a graph ? Explain them with an example of each.
27. Write a greedy algorithm for job sequencing with deadlines.
28. Write a program to find all  $m$ -colouring of a graph.
29. Write control abstraction for Greedy method.
30. Write a recursive algorithm to find the sum of  $N$  numbers. Calculate its space complexity.
31. Define and explain Sum of subsets problem.

(6 × 4 = 24)

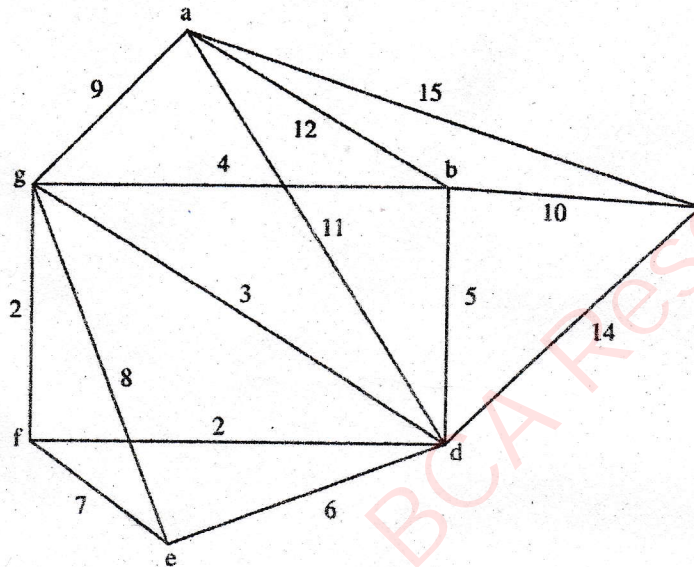
**Part D (Essay)**

*Answer any two questions.*

*Each question carries 15 marks.*

32. Explain Strassen's matrix multiplication with example.
33. Briefly explain an algorithm to solve 8 queens problem using back tracking.

34. What is minimum spanning tree? Execute Prim's Kruskal's algorithm to find the minimum spanning tree of the following graph.



35. Define a Knapsack problem. How will you solve Knapsack problem using Dynamic Programming? Illustrate with example.

$$(2 \times 15 = 30)$$



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**B.Sc/BCA DEGREE (CBCS) EXAMINATION, MAY 2019**

**Fourth Semester**

**Core Course - CS4CRT09 - DESIGN AND ANALYSIS OF ALGORITHMS**

(Common for B.Sc Information Technology Model III, Bachelor of Computer Application)

2017 Admission onwards

3965FC9E

**Maximum Marks: 80**

**Time: 3 Hours**

**Part A**

Answer any **ten** questions.

Each question carries **2** marks.

1. List out algorithm techniques.
2. What is best-case complexity?
3. List any four examples of problems using Divide and Conquer.
4. State the average case and worst case complexity of quicksort.
5. Write the complexity of;  
a) Selection sort    b) Mergesort
6. What is knapsack problem?
7. Explain the method of Kruskal's algorithm.
8. State Principle of Optimality.
9. Define the single source shortest path problem.
10. Give the time complexity and space complexity of TSP.
11. Define a planar graph.
12. What is a state space tree?

(10×2=20)

**Part B**

Answer any **six** questions.

Each question carries **5** marks.

13. Explain the Performance Analysis.
14. Compare time complexity and space complexity.
15. Illustrate the binary search algorithm with an example.
16. State the greedy method. Differentiate between the subset paradigm and ordering paradigm.
17. Explain in detail anyone of the problem solved using Greedy Method.
18. Explain all pair shortest path with algorithm.





19. Write the algorithm for 0/1 knapsack problem with example.
20. What are the basic differences in representing the directed and undirected graph?
21. Explain Hamiltonian circuit with suitable example.

(6×5=30)

### Part C

Answer any **two** questions.

Each question carries **15** marks.

22. What is an algorithm? Explain the different characteristics of algorithm. Explain the different areas of algorithm study.
23. Write an algorithm for Merge Sort and Derive its time complexity.
24. Explain Prim's algorithm with an example.
25. Explain the graph coloring problem and draw the state space tree for m=3 colors and n=4 vertices graph.

(2×15=30)

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**B.C.A. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2015****Third Semester**

Core Course – DESIGN AND ANALYSIS OF ALGORITHMS

(2013 Admission onwards)

Time : Three Hours

Maximum : 80 Marks

**Part A**Answer **all** questions.

1 mark each.

1. Define Algorithm.
2. What is an b-spaced array?
3. What is an optimal solution?
4. What is multi-stage graph?
5. What is biconnected graph?
6. What is depth-first number of a vertex?
7. What is E-node?
8. What is D-search?
9. What is chromatic number of a graph?
10. What is profiling?

(10 × 1 = 10)

**Part B**Answer any **eight** questions.

2 marks each.

11. How do you validate algorithms?
12. Write a recursive algorithm to print all possible permutations of a set.
13. How do you use median of medians rule to determine a partitioning element?
14. Distinguish between Space complexity and Time complexity of an algorithm.
15. What are the applications of spanning tree?
16. State the principle of optimality.

**Turn over**

17. What are the features of dynamic programming?
18. Write Bellman and Ford algorithm to compute shortest paths.
19. Distinguish between implicit and explicit constraints in back tracking.
20. How do you determine the efficiency of back tracking programs?
21. Distinguish between dead node and live node.
22. What is Hamiltonian cycle?

(8 × 2 = 16)

### Part C

Answer any **six** questions.

4 marks each.

23. Write a program to find the  $N^{\text{th}}$  Fibonacci number and analyse its time complexity.
24. Explain the procedure for matrix multiplication Strassen's method.
25. Write an algorithm for merge sort.
26. How do you apply greedy method to solve knapsack problem?
27. Write a recursive function to find maximum and minimum in a group of numbers.
28. Explain Prim's algorithm with necessary graph.
29. Describe Monte Carlo method.
30. Write an algorithm to test whether a connected graph is biconnected.
31. Give a solution to 8-queens problem via back tracking solution.

(6 × 4 = 24)

### Part D

Answer any **two** questions.

15 marks each.

32. Explain Dijkstra's algorithm with an example.
33. Discuss any *two* search methods.
34. Write algorithms :
  - (a) To find a minimum cost binary search tree.
  - (b) For 0/1 knapsack problem.
35. Show that the following equalities are incorrect :
  - (a)  $10n^2 + 9 = O(n)$ .
  - (b)  $n^2 \log n = \Theta(n^2)$ .
  - (c)  $n^2 / \log n = \Theta(n^2)$ .
  - (d)  $n^3 2^n + 6n^2 3^n = O(n^3 2^n)$

(2 × 15 = 30)



**B.C.A. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2018****Third Semester****Computer Applications****Core Course—DESIGN AND ANALYSIS OF ALGORITHMS**

[2013 to 2016 Admissions]

Time : Three Hours

Maximum Marks : 80

**Part A (Short Answer Questions)***Answer all questions.**Each question carries 1 mark.*

1. Express the formula  $(n - 2) * (n - 4)$  using  $\theta$  notation.
2. Recursive algorithms are based on \_\_\_\_\_ approach.
3. Worst case efficiency of binary search is \_\_\_\_\_.
4. The upper bound on the time complexity of the nondeterministic sorting algorithm is \_\_\_\_\_.
5. Greedy job scheduling with deadlines algorithms complexity is defined as \_\_\_\_\_.
6. The time complexity of the shortest path algorithm can be bounded by \_\_\_\_\_.
7. Prim's algorithm is based on \_\_\_\_\_ method.
8. The Knapsack problem where the objective function is to minimize the profit is \_\_\_\_\_.
9. How many edges are there in a Hamiltonian cycle if the edge cost is 'c' and the cost of cycle is 'cn'?
10. What is the type of the algorithm used in solving the 8 Queens problem?

(10 × 1 = 10)

**Part B (Short Answer Questions)***Answer any eight questions.**Each question carries 2 marks.*

11. What is performance measurement?
12. What is time complexity?
13. Define the asymptotic notation "Omega" ( $\Omega$ ).
14. Define control abstraction.
15. Write the analysis for the quick sort.
16. Write any two characteristics of Greedy Algorithm.
17. What is Knapsack problem?

**Turn over**



18. Define weighted tree.
19. Define post order traversal.
20. Define principle of optimality.
21. Define 0/1 knapsack problem.
22. Define chromatic number of the graph.

(8 × 2 = 16)

### Part C (Short Essay Type Questions)

Answer any **six** questions.

Each question carries 4 marks.

23. What are the characteristics of Algorithms.
24. What is Space Complexity ?
25. Write the binary search algorithm.
26. Sort the following using quick sort : 25, 57, 48, 37, 12, 92, 86, 33.
27. Explain Dijkstra single source shortest path algorithm.
28. What are the common ways to traverse a binary tree ?
29. Explain the concepts of 0/1 knapsack problem.
30. What is depth first search ? What are the disadvantages of depth first search ?
31. Explain bipartite graph with suitable example.

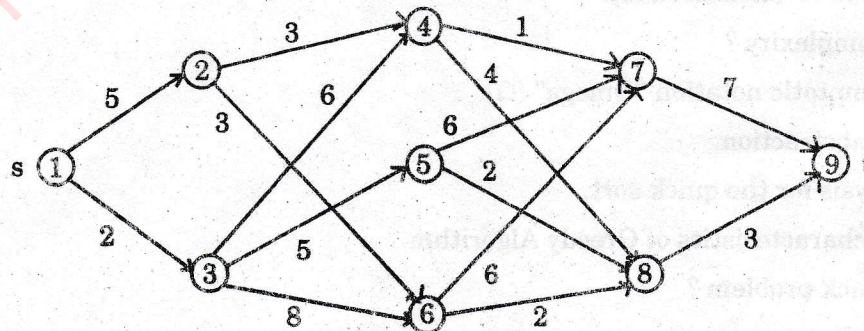
(6 × 4 = 24)

### Part D (Long Essays)

Answer any **two** questions.

Each question carries 15 marks.

32. Discuss in detail the asymptotic notations used to represent the complexity of an algorithm.
33. Explain merge sort. Illustrate merge sort on the following 8 entries 7, 2, 9, 4, 3, 8, 6, 1.
34. Discuss Kruskal's algorithm in detail.
35. Find the minimum cost path from s to t in the multistage graph of five stages shown below. Do this first using forward approach and then using backward approach :



(2 × 15 = 30)