



**2023/TDC(CBCS)/EVEN/SEM/  
CSCHCC-403T/324**

**TDC (CBCS) Even Semester Exam., 2023**

**COMPUTER SCIENCE**

**( Honours )**

**( 4th Semester )**

**Course No. : CSCHCC-403T**

**( Design and Analysis of Algorithms )**

**Full Marks : 70**

**Pass Marks : 28**

**Time : 3 hours**

*The figures in the margin indicate full marks  
for the questions*

**SECTION—A**

**Answer any ten of the following questions :  $2 \times 10 = 20$**

- 1. Write down the properties of algorithm.**
- 2. Why is hashing useful in algorithm?**
- 3. Write down the recurrence relation of Fibonacci series.**



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4. Write down the drawbacks of bucket sort.
5. What is the complexity of bubble sort?
6. Show that building a max or min heap is  $O(n)$ .
7. What is lower bound theory? Give example.
8. How does decision tree help to analyze the algorithm?
9. What is comparison tree?
10. Mention different algorithms used for string matching.
11. What is the complexity of Naive string matching algorithm?
12. What are the two methods of amortization?
13. How is adjacency matrix used to represent graph?
14. Write down the application of DFS.
15. Write down the difference between BFS and DFS.

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( Continued )

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SECTION—B

Answer any five of the following questions :  $10 \times 5 = 50$

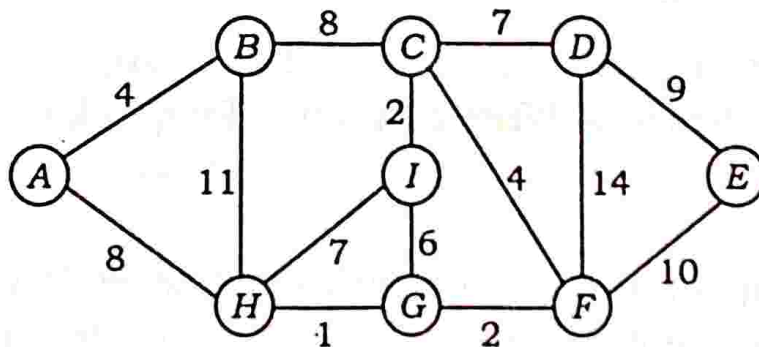
16. Write non-recursive version of binary search algorithm. Discuss its complexity. Given the following data, apply the binary search algorithm to locate 101 and 82 :  $4+2+4=10$   
7, 9, 0, -6, 23, -15, 82, 101, 54
17. What is greedy method? Discuss the knapsack problem.  $3+7=10$
18. Suppose  $A$  is the list of the following 12 numbers :  
44, 33, 11, 55, 77, 90, 40, 60, 99, 22, 88, 66  
Discuss quick sort algorithm to sort the list of elements. Write a function for quick sort.  $5+5=10$
19. Explain radix sort algorithm. Also explain the time and space complexity of an algorithm.  $7+3=10$
20. How are total number of comparisons analyzed through decision tree? Explain the comparison tree for binary search.  $5+5=10$

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( Turn Over )



21. What are different operations on Red Black trees? Explain with algorithms. 10
22. "Amortized analysis guarantees that the average case time complexity of an operation is constant, even if some operations may be expensive." Explain with example. 10
23. Explain the amortized analysis of insertion in Red Black tree. 10
24. Explain depth first search algorithm with suitable example. 10
25. Explain Prim's algorithm for minimum cost spanning tree. Consider the following graph to find the minimum spanning tree : 5+5=10



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