(7 pages) **Reg. No. :** .....

Code No. : 20419 E **Sub. Code : SECA 5 B**

B.C.A. (CBCS) DEGREE EXAMINATION, NOVEMBER 2021.

Fifth Semester

Computer Application – Core

Major Elective – DESIGN AND ANALYSIS OF ALGORITHMS

(For those who joined in July 2017-2019)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The six-step solution for the problem can be applied to

   I. Problems with Algorithmic Solution

   II. Problems with Heuristic Solution

   (a) Only I (b) Only II

   (c) Both I and II (d) Neither I nor II

2. ———————— solution requires reasoning built on knowledge and experience.

(a) Algorithmic Solution

(b) Heuristic Solution

(c) Random Solution

(d) None of these

3. Which of the following sorting algorithms does not have a worst case running time of O(n2)? Select one:

(a) Quick sort (b) Merge sort

(c) Insertion sort (d) Bubble sort Incorrect

4. How many number of comparisons are required in insertion sort to sort a file if the file is sorted in reverse order?

(a) N2 (b) N

(c) N-1 (d) N/2

5. The number of edges from the root to the node is called _____ of the tree.

(a) Height

(b) Depth

(c) Length

(d) None of the mentioned

6. In a full binary tree if number of internal nodes is I, then number of leaves L are?

(a) $L = 2I$ (b) $L = I + 1$

(c) $L = I - 1$ (d) $L = 2I - 1$

7. What will be the height of a balanced full binary tree with 8 leaves?

(a) 8 (b) 5

(c) 6 (d) 4

8. Which of the following statements for a simple graph is correct?

(a) Every path is a trail

(b) Every trail is a path

(c) Every trail is a path as well as every path is a trail

(d) None of the mentioned

9. What is the maximum number of edges in a bipartite graph having 10 vertices?

(a) 24 (b) 21

(c) 25 (d) 16

10. For a given graph G having v vertices and e edges which is connected and has no cycles, which of the following statements is true?

(a) v = e

(b) v = e + 1

(c) v + 1 = e

(d) None of the mentioned

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What are graphs in algorithms?

Or

(b) What is tree in DAA?

12. (a) What are all the different sorting algorithms?

Or

(b) What is the complexity of heap sort algorithm?

13. (a) What does binary search mean?

Or

(b) What is the difference between a linear search algorithm and a binary search algorithm?

14. (a) What is BFS and DFS in graph?

Or

(b) What is closure of a relation?

15. (a) What is the recurrence relation used in Strassen's algorithm?

Or

(b) What is LU decomposition used for?

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Explain the properties of an algorithm with an example.

Or

(b) Give the algorithm for matrix multiplication and find the time complexity of the algorithm using step - count method.

17. (a) State the Greedy Knapsack? Find an optimal solution to the Knapsack instance n = 3, m = 20, (P1, P2, P3) = (25, 24, 15) and (W1, W2, W3) = (18, 15, 10).

Or

(b) What is a Spanning tree? Explain Prim's Minimum cost spanning tree algorithm with suitable example.

18. (a) Draw an Optimal Binary Search Tree for n = 4 identifiers (a1, a2, a3, a4) = (do, if, read, while) P(1:4) = (3, 3, 1, 1) and Q(0:4) = (2, 3, 1, 1, 1).

Or

(b) Explain how Matrix - chain Multiplication problem can be solved using dynamic programming with suitable example.

19. (a) Write control abstraction for backtracking.

Or

(b) Explain the Graph - coloring problem. And draw the state space tree for m=3 colors n = 4 vertices graph. Discuss the time and space complexity.

20. (a) Draw the portion of state space tree generated by FIFOBB for the job sequencing with deadlines instance n=5, (p1,p2,..,p5) = (6,3,4,8,5), (t1,t2,..t5) (2,1,2,1,1) and (d1,d2,..,d5) = (3,1,4,2,4). What is the penalty corresponding to an optimal solution.

Or

(b) Draw the portion of state space tree generated by LCBB for the 0/1 Knapsack instance: n= 5, (p1,p2,...,p5) = (10,15,6,8,4), (w1,w2,..,w5) = (4,6,3,4,2) and m=12. Find an optimal solution using fixed - tuple sized approach.

———————