

**B.E DEGREE EXAMINATIONS: NOV/DEC 2024**

(Regulation 2018)

Fourth Semester

**INFORMATION SCIENCE AND ENGINEERING**

U18IST4001: Design and Analysis of Algorithms

**COURSE OUTCOMES**

**CO1:** Compare various graph traversal techniques.

**CO2:** Apply algorithm analysis techniques for a given algorithms.

**CO3:** Examine algorithm design techniques for a given application.

**CO4:** Analyze different algorithms for solving a given problem.

**CO5:** Develop application using chosen algorithm technique.

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

1. Represent the following in adjacency matrix format. CO1 [K<sub>1</sub>]
  
2. Name the basic operation performed in sorting. What is the order best sorting algorithm? CO1 [K<sub>1</sub>]
3. Find the time complexity for n number of moves in solving Tower of Hanoi problem while using recursive algorithm. CO2 [K<sub>2</sub>]
4. Classify algorithm visualization techniques. CO2 [K<sub>1</sub>]
5. Construct a recursive algorithm to generate Factorial of N. CO3 [K<sub>2</sub>]
6. State the L'Hopital's rule and the Strilings formula. CO3 [K<sub>1</sub>]
7. Analyze the order of binary search problem if the number are in unsorted manner. CO4 [K<sub>3</sub>]
8. Analyze sequential searching algorithms and estimate their best-case, worst-case and average-case behavior. CO4 [K<sub>3</sub>]
9. Write about Graph coloring problem. CO5 [K<sub>2</sub>]
10. List the steps involved in back tracking technique. CO5 [K<sub>1</sub>]

**Answer any FIVE Questions:-**  
**PART B (5 x 16 = 80 Marks)**  
**(Answer not more than 400 words)**

11. a) Explain analysis framework and basic efficiency classes with appropriate example. 10 CO1 [K<sub>2</sub>]  
 b) Demonstrate topological sorting algorithm with example 6 CO1 [K<sub>2</sub>]

12. a) Develop an algorithm to solve Tower of Hanoi problem and analyze the efficiency of that algorithm. 8 CO2 [K<sub>2</sub>]  
 b) Illustrate state space tree for 4 Queen problem using backtracking technique. 8 CO2 [K<sub>2</sub>]

13. a) Apply dynamic programming and greedy technique to the following instance of Knapsack Problem. Find the optimal solution for the given problem. Knapsack Capacity W=5. 16 CO3 [K<sub>3</sub>]

Item	Weight	Value
1	2	\$12
2	1	\$10
3	3	\$20
4	2	\$15

- b) Describe the algorithm visualization techniques with appropriate example. 6 CO3 [K<sub>2</sub>]

14. 16 CO5 [K<sub>3</sub>]  
 Make use of the graph and find shortest path from node a by applying Travelling salesman algorithm using Branch and Bound technique.

	a	b	C	d
a	0	2	5	7
b	2	0	8	3
c	5	8	0	1
d	7	3	1	0

15. Prepare an algorithm for Dynamic programming used in optimal BST and analyze algorithm. Solve the problem given below and construct the OBST from the keys. 16 CO4 [K<sub>3</sub>]

Keys	A	B	C	D
Probability	0.1	0.2	0.4	0.3

16. Develop a pseudocode for Huffman tree construction algorithm.  
Find the code for symbols using Huffman tree.

16 CO4 [K<sub>3</sub>]

Symbols	A	B	C	D	E
Frequency	24	12	10	8	8

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