



B.E/B.TECH DEGREE EXAMINATIONS: APRIL /MAY 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 algorithm
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)

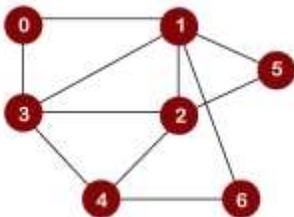
- | | | |
|---|-----|-------------------|
| 1. Write about transitive closure of the graph. | CO1 | [K ₁] |
| 2. What is topological sorting of a directed acyclic graph? | CO1 | [K ₁] |
| 3. Distinguish optimal and feasible solution. | CO2 | [K ₄] |
| 4. Define state space tree. | CO2 | [K ₁] |
| 5. Find the number of character comparisons that will be made by straight forward string matching for the pattern ABACC in the following text.
BAABABABCCA | CO3 | [K ₂] |
| 6. Compare backtracking and branch-and-bound. | CO3 | [K ₂] |
| 7. List the characteristics of greedy algorithm. | CO4 | [K ₁] |
| 8. Construct Euclid's algorithm to find GCD of 2 numbers. | CO4 | [K ₃] |
| 9. State the concept of graph coloring. | CO5 | [K ₁] |
| 10. Identify the approaches that can be used to solve the assignment problem. | CO5 | [K ₁] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

- | | | | | |
|--------|---|---|-----|-------------------|
| 11. a) | Give the various representation of the graph given below: | 8 | CO1 | [K ₂] |
|--------|---|---|-----|-------------------|



- b) Develop an algorithm to solve Tower of Hanoi problem and analyze the efficiency of that algorithm. 8 CO2 [K₃]
12. a) Outline the different steps involved in the algorithm design and analysis process. 10 CO3 [K₂]
 b) Analyze sequential searching algorithms and estimate their best-case, worst-case and average-case behavior. 6 CO2 [K₃]
13. a) Solve the following recurrence relations using backward substitution techniques. 8 CO3 [K₃]
 b) How to analyze non recursive algorithms?. Analyze matrix multiplication algorithm using the above procedure. 8 CO3 [K₂]
14. a) Solve the problem of placing 4-Queens such that each cannot attack other queen using backtracking. 8 CO4 [K₃]
 b) *Construct an algorithm for Dynamic programming used in optimal BST and analyze algorithm. Solve the problem given below and construct the OBST from the keys.* 8 CO4 [K₃]
Keys A B C D
Probability 0.1 0.2 0.4 0.3
15. 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 CO4 [K₂]

item	weight	value
1	2	\$12
2	1	\$10
3	3	\$20
4	2	\$15

capacity $W = 5$.

16. a) Solve the Travelling Salesman Problem using Branch and bound techniques. 8 CO5 [K₄]
 b) Discuss about any two approximation Algorithms for NP-hard Problems with appropriate example. 8 CO5 [K₂]
