KUMARAGURU
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B.E. DEGREE EXAMINATIONS: APRIL / MAY 2023

(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: -
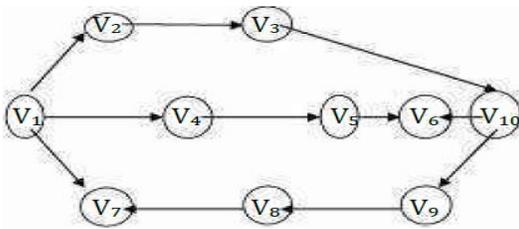**PART A (10 x 2 = 20 Marks)**
(Answer not more than 40 words)

1.	How does kruskal's algorithm is used to find a minimum spanning tree?	CO1	[K2]
2.	Write BFS algorithm.	CO1	[K1]
3.	List the properties of asymptotic notations.	CO2	[K1]
4.	Write the recurrence relation of divide-and-conquer?	CO2	[K1]
5.	How will you construct an optimal binary search tree?	CO3	[K2]
6.	Write the Brute force algorithm for string matching.	CO3	[K2]
7.	List out the 4 steps in Strassen's Method?	CO4	[K1]
8.	Difference between the greedy method and dynamic programming.	CO4	[K2]
9.	What is promising and non-promising node?	CO5	[K2]
10.	What is the reason that NP-complete problems are the hardest?	CO5	[K2]

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

11.	a)	Discuss the algorithm and pseudocode to find minimum spanning tree using Prim's algorithm from the given graph.	8	CO1 [K3]
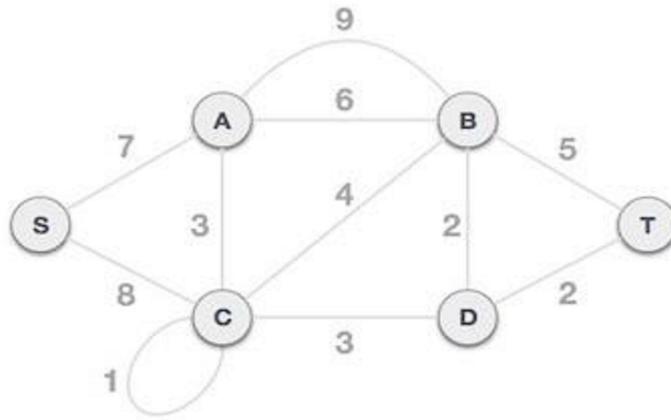
| b) | Apply the principle of topological sort in given graph and find running time for given graph. | 8 | CO1 | [K_3] |

| 12. | a) | Compute the factorial function $F(n) = n!$ for an arbitrary nonnegative integer n using mathematical analysis of recursive algorithms. | 10 | CO2 | [K_3] |
| | b) | Design a brute-force algorithm for computing the value of a polynomial. $P(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x \ldots a_0$ at a given point x_0 | 6 | CO2 | [K_3] |

| 13. | a) | Describe Brute force closest-pair algorithm and string matching using brute force method the example is NOBODY – NOTICE is the text and NOT is the pattern to be searched. | 10 | CO3 | [K_3] |
| | b) | Explain the fundamental steps involved in algorithmic problem solving? | 6 | CO2 | [K_2] |

| 14. | a) | Draw the state space tree with 4-queen's problem. | 8 | CO5 | [K_3] |
| | b) | Apply the large integer multiplication using divide and conquer to multiply 2345 with 678. | 8 | CO3 | [K_3] |

| 15. | a) | Write the insertion routines of binary search tree and insert the following element in a BST 5,3,7,8. | 8 | CO4 | [K_2] |

b) Find an optimal Solution for the following 0/1 Knapsack instance using greedy method. Number of objects n=4, capacity of knapsack W=8, profits= (2,4,7,10), Weights= (1,3,5).   8   CO4 [K$_3$]

16. a) Construct states pace tree using brand and band approach using Assignment Problem.   10   CO5 [K$_3$]

	Job1	Job2	Job3	Job4
Person a	9	2	7	8
Person b	6	4	3	7
Person c	5	8	1	8
Person d	7	6	9	4

b) Explain about P and NP class and their relationshio with an example.   6   CO5 [K$_4$]

Differentiate between P and NP class of problem with an example each.

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