

**P.E.S. College of Engineering, Mandya - 571 401***(An Autonomous Institution affiliated to VTU, Belagavi)***First Semester, M. Tech - Computer Science and Engineering (MCSE)****Semester End Examination; April / May - 2021****Advanced Algorithms**

Time: 3 hrs

Max. Marks: 100

Course Outcomes*The Students will be able to:**CO1: Analyze and find the complexity of the given problem.**CO2: Design efficient algorithm using Divide-and-Conquer Strategy.**CO3: Design and analyze algorithms to optimization problems.**CO4: Compute optimal solution for the problem using approximation algorithms.**CO5: Apply randomized algorithms for the given problem.***Note: I) Answer any FIVE full questions, selecting ONE full question from each unit.****II) Any THREE units will have internal choice and remaining TWO unit questions are compulsory.****III) Each unit carries 20 marks.**

Q. No.	UNIT - I	Marks	BLs	COs	POs																								
1a.	Write a greedy algorithm to generate an optimal 2-way merge tree. Apply the algorithm on sorted lists with length 2, 3, 5,7,11 and 13.	10	L2	CO1	PO1																								
b.	Discuss minimum cycle basis problem solved by greedy algorithm. Illustrate the process of finding minimum cycle basis for an undirected graph.	10	L2,3	CO1	PO1																								
UNIT - II																													
2 a.	Discuss Voronoi diagram algorithm constructed using hyper plane method by applying divide and conquer strategy.	10	L2	CO2																									
b.	Apply hill climbing strategy to find goal state from initial state to solve 8-puzzle problem.																												
	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>2</td><td>8</td><td>3</td></tr> <tr><td>1</td><td></td><td>4</td></tr> <tr><td>7</td><td>6</td><td>5</td></tr> <tr><td colspan="3" style="text-align: center;">Initial</td></tr> </table> <table border="1" style="display: inline-table; vertical-align: middle; margin-left: 20px;"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>7</td><td>8</td><td>4</td></tr> <tr><td></td><td>6</td><td>5</td></tr> <tr><td colspan="3" style="text-align: center;">Goal state</td></tr> </table>	2	8	3	1		4	7	6	5	Initial			1	2	3	7	8	4		6	5	Goal state			10	L3	CO2	PO2
2	8	3																											
1		4																											
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OR																													
2 d.	Discuss channel routing problem solved by A* algorithm with an illustration.	10	L2	CO2	PO2																								
e.	Discuss maxima finding problem in two dimensional spaces. Derive an algorithm to efficiently find maximal points in a given set of points.	10	L2	CO2	PO2																								
UNIT - III																													
3 a.	Write an algorithm to find K^{th} smallest element using prune and search algorithm.	10	L2	CO3	PO2																								

- b. Consider four resources and three projects and profit matrix

		Resources			
		1	2	3	4
Projects	1	6	8	8	10
	2	5	11	16	17
	3	1	4	5	6

10 L4 CO3 PO3

Solve the above resource allocation problem by using dynamic programming method.

OR

- 3 d. Write prune and search algorithm to solve 2-variable linear programming problem.

10 L2 CO3 PO2

- e. Apply longest common subsequence algorithm for,

A	a	b	a	a	d	e	c
B	c	a	a	c	e	d	c

10 L3 CO3 PO1

UNIT - IV

- 4 a. Write an approximation algorithm for the rectilinear m -centre problem.

10 L2 CO4 PO2

- b. Write an approximation algorithm for the Bin packing problem.

10 L2 CO4 PO1

UNIT - V

- 5 a. Discuss how randomized algorithm can be utilized to solve the closest pair problem?

10 L2 CO5 PO3

- b. Discuss online k -server problem solved by greedy technique.

10 L2 CO5 PO3

OR

- d. Discuss randomized algorithm to test whether a given number is prime or not.

10 L2 CO5 PO2

- e. Discuss online Euclidean spanning tree problem solved by greedy method.

10 L2 CO5 PO3

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