

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Regular and Supplementary Summer Examination -2024 Course: B. Tech. Branch : Computer Engineering and Allied Semester :IV Subject Code & Name: Design and Analysis Of Algorithms(BTCOC401) Max Marks: 60 Date:12/06/2024 Duration: 3 Hrs.						
	Instructions to the Students: 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly.						
					(Level/CO)	Marks	
Q. 1	Solve Any Two of the following.						
A)	Solve the following recurrences using Master Theorem. (i) $T(n) = 16T(n/4) + n$. (ii) $T(n) = T(2n/3) + 1$ (iii) $T(n) = 3T(n/4) + n \log n$					Apply 6	
B)	What are different asymptotic notations? Explain with neat graphs. If $f(n) = \sqrt{n}$ and $g(n)=n$ then prove that $f(n)$ is $O(g(n))$.					Analyze 6	
C)	What are the different properties of algorithm ? Which factors affect runtime of an algorithm ?					Understand 6	
Q.2	Solve Any Two of the following.						
A)	Apply Strassen's matrix multiplication algorithm on following matrices. $\begin{Bmatrix} 2 & 3 \\ 6 & 8 \end{Bmatrix} \quad \begin{Bmatrix} 1 & 2 \\ 3 & 6 \end{Bmatrix}$					Apply 6	
B)	What is best case and worst case time complexity for Merge Sort ? Apply Merge Sort on following array. A = { 13, 4, 22, 1,16, 9,0,2}					Apply 6	
C)	Distinguish between Divide and Conquer and Dynamic programming approach .					Understand 6	
Q. 3	Solve Any Two of the following.						
A)	Apply Huffman Coding algorithm on following data. Write the code for each character using Huffman Coding algorithm.					Apply 6	
	Character	a	b	c	d	e	f
	Frequency	45	13	12	16	9	5

B)	Apply greedy approach to solve following fractional knapsack problem if capacity of knapsack is 60 kg. Calculate maximum profit. <table><tr><th>Item</th><th>Weight(in KG)</th><th>Value (Profit)</th></tr><tr><td>1</td><td>5</td><td>30</td></tr><tr><td>2</td><td>10</td><td>40</td></tr><tr><td>3</td><td>15</td><td>45</td></tr><tr><td>4</td><td>22</td><td>77</td></tr><tr><td>5</td><td>25</td><td>90</td></tr></table>	Item	Weight(in KG)	Value (Profit)	1	5	30	2	10	40	3	15	45	4	22	77	5	25	90	Apply	6
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1	5	30																			
2	10	40																			
3	15	45																			
4	22	77																			
5	25	90																			
C)	Calaculate shortest path from node S to all nodes for following graph using Dijkstra's algorithm.	Apply	6																		
Q.4	Solve Any Two of the following.																				
A)	Apply Floyd Warshall's algorithm on following graph.	Apply	6																		
B)	Determine Longest Common Subsequence between X and Y if X=< x m j y a u z> and Y= <m z j a w x u>.	Apply	6																		
C)	Explain the following terms. (i) P -problem (ii) NP problem (iii)NP complete problem	Understand	6																		
Q. 5	Solve Any Two of the following.																				
A)	How 4 –Queens problem is solved by backtracking approach ? Draw state space tree for 4- Queens problem?	Analyze	6																		
B)	Solve the following travelling salesman problem using branch and bound approach.	Apply	6																		

	<table><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>1</td><td>∞</td><td>20</td><td>30</td><td>10</td><td>11</td></tr><tr><td>2</td><td>15</td><td>∞</td><td>30</td><td>10</td><td>11</td></tr><tr><td>3</td><td>3</td><td>5</td><td>∞</td><td>2</td><td>4</td></tr><tr><td>4</td><td>19</td><td>6</td><td>18</td><td>∞</td><td>3</td></tr><tr><td>5</td><td>16</td><td>4</td><td>7</td><td>16</td><td>∞</td></tr></table>		1	2	3	4	5	1	∞	20	30	10	11	2	15	∞	30	10	11	3	3	5	∞	2	4	4	19	6	18	∞	3	5	16	4	7	16	∞		
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5	16	4	7	16	∞																																		
C)	Compare and contrast backtracking and branch and bound approach.	Understand	6																																				
	*** End ***																																						

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