



School of Computer Science and Engineering

Winter Semester 2023-2024

Continuous Assessment Test – 1

Programme Name & Branch: B.Tech (BCB/BCE/BCI/BCT/BDS/BKT) Slot : A1+TA1

Course Name & code: BCSE204L – Design and Analysis of Algorithms

Class Number (s): ALL

Faculty Name (s): ALL

Exam Duration: 90 Mins.

Max. Marks: 50

General instruction(s): ANSWER ALL THE QUESTIONS

Q.No.	Question	CO	BL																																				
1.	(a) Discuss the selection sort algorithm by providing its pseudo code. Discuss the loop invariant in perception with selection sort algorithm. Check the proof of correctness for the same. (4)	CO1	BL5																																				
	b) Using the master’s theorem, solve the recurrence relation (i) $T(n) = 4T\left(\frac{n}{2}\right) + n^2$ (ii) $T(n) = 7T\left(\frac{n}{2}\right) + 18n^2$ (6)																																						
2.	Consider the string “ <i>shesellsseashellsbytheseashores</i> ”. Use minimum number of bits for transmitting the said string. Calculate the number of bits used to encode this using Huffman coding technique. Identify the bits required in both fixed-size and variable length encoding.	CO2	BL4																																				
3.	Design and develop an algorithm to multiply 2 integers and analyze their time complexity. Illustrate the technique to multiply the numbers 1334, and 1253.	CO2	BL3																																				
4.	Provide the optimal parenthesization while multiplying the matrices A1, A2, A3, A4, A5 having dimensions mentioned below. <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr><td style="padding: 2px;">A1</td><td style="padding: 2px;">2 × 5</td></tr> <tr><td style="padding: 2px;">A2</td><td style="padding: 2px;">5 × 10</td></tr> <tr><td style="padding: 2px;">A3</td><td style="padding: 2px;">10 × 5</td></tr> <tr><td style="padding: 2px;">A4</td><td style="padding: 2px;">5 × 6</td></tr> <tr><td style="padding: 2px;">A5</td><td style="padding: 2px;">6 × 10</td></tr> </table>	A1	2 × 5	A2	5 × 10	A3	10 × 5	A4	5 × 6	A5	6 × 10	CO2	BL5																										
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5.	Define 6-Queens problem. Assuming that the queens are placed column-wise in the 6-Queens problem solved using backtracking. Consider the following intermediate state where the queens are attacking each other. Show the steps that involve backtracking to attain the solution where no queen attacks the other. <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>Q</td><td></td><td></td><td></td></tr> <tr><td>Q</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td>Q</td><td></td><td>Q</td></tr> <tr><td></td><td>Q</td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td>Q</td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>			Q				Q									Q		Q		Q									Q								CO2	BL4
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