



SRM Institute of Science and Technology Set A

College of Engineering and Technology

School of Computing

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

Academic Year: 2022-23 (Even)

Test: CLA-T1	Date: 13-02-2023
Course Code & Title: 18CSC204J Design and Analysis of Algorithms	Duration: 60 mins
Year & Sem: II Year / IV Sem	Max. Marks: 25

Course Articulation Matrix:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	-	3	2	-	-	-	-	-	-	-	-	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-
CO6	-	2	3	-	-	-	-	-	-	-	-	-

Part – A
(5 x 1 = 5 Marks)

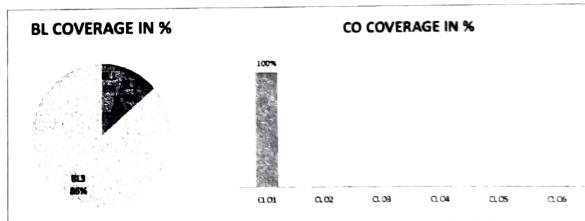
Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	What is the advantage of recursive approach than an iterative approach? a) Consumes less memory b) Less code and easy to implement c) Consumes more memory d) Easy to test and debug during iteration	1	2	1	2	2.1.1
2	Which one is the correct order of increasing growth? a) $O(1)$, $O(\log n)$, $O(\log \log n)$ b) $O(1)$, $O(\log n)$, $O((\log n)^2)$, $O(\log n)$ c) $O(1)$, $O(\log \log n)$, $O(\log n)$, $O((\log n)^2)$ d) $O(1)$, $O(\log n)$, $O((\log n)^2)$, $O(\log \log n)$	1	2	1	2	2.3.1
3	refers to an algorithm should be a well defined and ordered procedure that consists of a set of instructions in a specific order. a) Definiteness b) Correctness c) Finiteness d) Effectiveness	1	1	1	2	2.1.1
4	Problem solving starts from subproblems of the given problem to the global problem is a) Top-down design b) Bottom-up design c) Mixed design d) Variable design	1	1	1	2	2.2.2
5	Which of the following type of algorithm use looping constructs specifically for iterating a set of tasks? a) Recursive b) Non-recursive	1	2	1	1	1.1.1

Part - B (2 x 10 Marks = 20 Marks)						
Instructions: Answer any 2 Questions						
6	Babu has six different sets of note books. He arranges note books by comparing its length only with his previous note book every time. Suggest the suitable comparison sorting algorithm to Babu. A list of unsorted note books is: 78 23 45 8 32 36. Also find the Best and Worst case of the scenario with its time complexity.	10	3	1	2	2.2.3
7	Determine the time complexity by generating a recurrence relation of a given pseudocode. <pre>fun check(int x) { if(x>0) { printf("%d",x); check(x-1); check(x-1); } }</pre>	10	3	1	2	2.3.2
8	(i) Consider the following segment and examine the time complexity using operation count method <pre>Algorithm p_mat(a, r, c) { for i:= 1 to r do { for j:= 1 to c do print(a[i][j]); print("n"); } }</pre> (ii) Given $f(n)=2n^2+n$ and $g(n)=n^3$. Show that $g(n)=O(f(n))$ and $f(n)=O(g(n))$ by exhibiting value of c and n.	5	3	1	2	2.3.2

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Course Outcome (CO) and Bloom's level (BL) Coverage in Questions



Test: CLA-T1

Date: 13-02-2023

Course Code & Title: 18CSC204J Design and Analysis of Algorithms Duration: 60 mins

Year & Sem: II Year / IV Sem Max. Marks: 25

Course Articulation Matrix:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO12
CO1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	-	3	2	-	-	-	-	-	-	-	-	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-
CO6	-	2	3	-	-	-	-	-	-	-	-	-

Part – A
(5 x 1 = 5 Marks)

Instructions: Answer all

Q. No.	Question	Marks	BL	CO	PO	PI Code
1	_____ within the limit deals with the behavior of a function for sufficiently large values of its parameter. <input checked="" type="checkbox"/> a) Asymptotic notation <input type="checkbox"/> b) Big-Oh notation <input type="checkbox"/> c) Omega notation <input type="checkbox"/> d) Theta notation	1	1	1	2	2.3.1
2	A _____ is a compact, informal, and environment-independent description of a computer programming algorithm. <input type="checkbox"/> a) Stack <input type="checkbox"/> b) Queue <input checked="" type="checkbox"/> c) Pseudocode <input type="checkbox"/> d) Non-linear	1	1	1	2	2.1.1
3	How many number of passes are required for sorting 8 elements list in bubble sort in the worst case? <input type="checkbox"/> a) 0 <input type="checkbox"/> b) 9 <input checked="" type="checkbox"/> c) 8 <input type="checkbox"/> d) 7	1	2	1	2	2.2.2
4	The time factor when determining the efficiency of algorithm is measured by <input type="checkbox"/> a) Counting microseconds <input type="checkbox"/> b) Counting the number of key operations <input checked="" type="checkbox"/> c) Counting the number of statements <input type="checkbox"/> d) Counting the kilobytes of algorithm	1	2	1	2	2.1.2

5	Which of the following recurrence relations can be used to find the nth fibonacci number? <input checked="" type="checkbox"/> a) $f(n) = f(n) + f(n - 1)$ <input type="checkbox"/> b) $f(n) = f(n) + f(n + 1)$ <input type="checkbox"/> c) $f(n) = f(n - 1)$ <input type="checkbox"/> d) $f(n) = f(n - 1) + f(n - 2)$	1	2	1	2	2.1.3
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Part – B
(2 x 10 Marks = 20 Marks)

Instructions: Answer any 2 Questions

6	Yash wants to buy a phone to his mother. In the shop, the phones are in the unsorted list. He wants to check the phone features based on the price of the adjacent phone. Kindly help him to suggest the comparison-based algorithm which takes a more number of swaps to arrange it in order. The lists are, 50, 25, 5, 20, 10. Also give the best and worst case of this scenario with time complexity.	10	3	1	2	2.2.3
7	Deduce the time complexity of a given relation using Recursion Tree approach. $T(n) = \sum_{i=1}^{\lfloor n/4 \rfloor} T(n/4) + T(n/2) + n^2; n>1$	10	3	1	2	2.3.2
8	(i) Given $f(n) = 3n^2 + 2n + 5$; $g(n) = n^2$. Show that $f(n) = O(g(n))$ and $g(n) = \Theta(f(n))$. (ii) Consider problem P and provide various possible algorithm design techniques to solve the given problem.	5	3	1	2	2.2.2

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Course Outcome (CO) and Bloom's level (BL) Coverage in Questions

BL COVERAGE IN %



CO COVERAGE IN %



Approved by the Audit Professor/Course Coordinator



SRM Institute of Science and Technology Set A

College of Engineering and Technology

School of Computing

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

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Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	-	-	-	-	-	-	-	-	-
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CO3	-	3	3	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-
CO6	-	2	3	-	-	-	-	-	-	-	-	-

Part - A
(5 x 1 = 5 Marks)

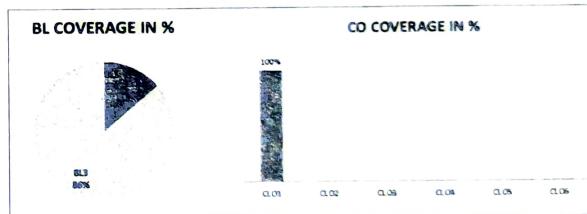
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Q. No	Question	Marks	BL	CO	PO	PI Code
1	What is the advantage of recursive approach than an iterative approach? a) Consumes less memory b) Less code and easy to implement c) Consumes more memory d) Easy to test and debug during iteration	1	2	1	2	2.1.1
2	Which one is the correct order of increasing growth? a) O(1), O(log n), O(log log n), O((log n)^2) b) O(1), O(log log n), O(log n), O(log n) c) O(1), O(log n), O(log log n), O((log n)^2) d) O(1), O(log n), O((log n)^2), O(log log n)	1	2	1	2	2.3.1
3	refers to an algorithm should be a well defined and ordered procedure that consists of a set of instructions in a specific order. a) Definiteness b) Correctness c) Finiteness d) Effectiveness	1	1	1	2	2.1.1
4	Problem solving starts from subproblems of the given problem to the global problem is a) Top-down design b) Bottom-up design c) Mixed design d) Variable design	1	1	1	2	2.2.2
5	Which of the following type of algorithm use looping constructs specifically for iterating a set of tasks? a) Recursive b) Non-recursive c) Both a and b d) Infinite	1	2	1	1	1.1.1

Part - B (2 x 10 Marks = 20 Marks)						
Instructions: Answer any 2 Questions						
6	Babu has six different sets of note books. He arranges note books by comparing its length only with his previous note book every time. Suggest the suitable comparison sorting algorithm to Babu. A list of unsorted note books is: 78 23 45 8 32 36. Also find the Best and Worst case of the scenario with its time complexity.	10	3	1	2	2.2.3
7	Determine the time complexity by generating a recurrence relation of a given pseudocode. <pre>fun check(int x) { if(x>0) { printf("%d",x); check(x-1); check(x-1); } }</pre>	10	3	1	2	2.3.2
8	(i) Consider the following segment and examine the time complexity using operation count method <pre>Algorithm p_mat(a, r, c) { for i:= 1 to r do { for j:= 1 to c do print(a[i][j]); print(" \n"); } }</pre> (ii) Given $f(n)=2n^2+n$ and $g(n)=n^3$. Show that $g(n)=\Omega(f(n))$ and $f(n)=O(g(n))$ by exhibiting value of c and n _a	5	3	1	2	2.3.2

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Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





SRM Institute of Science and Technology Set B
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School of Computing

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Course Articulation Matrix:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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CO2	-	3	2	-	-	-	-	-	-	-	-	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-
CO6	-	2	3	-	-	-	-	-	-	-	-	-

Part – A
(5x 1 = 5 Marks)

Instructions: Answer all

Q. N o	Question	Marks	BL	CO	PO	PI Code
1	criteria denote that, each step in an algorithm must be such that it can, at least in principle, be done by a person using pencil and paper in a finite amount of time.	1	1	1	2	2.1.1
a)	Finiteness					
b)	Definiteness					
c)	Effectiveness					
d)	Ambiguous					
2	The running time of the recursive algorithm can be determined by _____	1	2	1	2	2.3.1
a)	Operation count					
b)	Iterative method					
c)	Recurrence relation					
d)	Tabular method					
3	If $f(n)=O(g(n))$ then $g(n)=O(h(n))$, then _____.	1	1	1	2	2.1.1
a)	$f(n)=\Theta(h(n))$					
b)	$f(n)=\Omega(h(n))$					
c)	$f(n)=O(h(n))$					
d)	either b or c					
4	There are four algorithms A1, A2, A3, A4 to solve the given problem with the order n , n^2 , $n^2 \log n$ and 2^n respectively. Which is the worst algorithm?	1	2	1	2	2.3.1
a)	A1					
b)	A2					
c)	A3					
d)	A4					

5	Which of the following uses divide and conquer approach? a) Factorial b) Fibonacci c) Merge sort d) Sequential search	1	2	1	2	2.3.1
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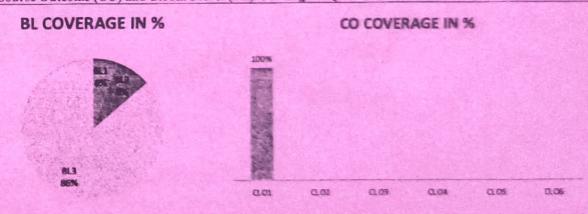
Part – B
(2 x 10 Marks = 20 Marks)

Instructions: Answer any 2 Questions

6	You are playing a game where your task is to arrange the cards in ascending order. You have an option to exchange the one card at a time from your neighbor. The given cards are 6,4,1,2,5. Find the suitable algorithm to arrange cards in order and analyze the time complexities of the given scenario.	10	3	1	2	2.2.3
7	Deduce the time complexity of a given relation using Recursion Tree approach. $T(n) = \begin{cases} T(n/3) + T(2n/3) + n; & n>1 \\ 1 & ; n=1 \end{cases}$	10	3	1	2	2.3.2
8	(i) Given $g(n)=2n^3 + 3n^2+4$ and $f(n)=n^2 \log n$. Show that $f(n)=O(g(n))$ and $g(n)=\Omega(f(n))$. (ii) Examine the following pseudocode and calculate the time complexity using operation count method. Begin sum=0; for (i=4;i<n;i++) for (j=0;j<=i;j++) sum++; end for end for end	5	3	1	2	2.2.2

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Course Outcome (CO) and Bloom's level (BL) Coverage in Questions



Approved by the Audit Professor/Course Coordinator

Test: CLA-T1	Date: 13-02-2023
Course Code & Title: 18CSC2041 Design and Analysis of Algorithms Duration: 60 mins	Year & Sem: II Year / IV Sem
	Max. Marks: 25

Course Articulation Matrix:												
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	-	3	2	-	-	-	-	-	-	-	-	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-
CO6	-	2	3	-	-	-	-	-	-	-	-	-

Instructions: Answer all

Part – A		(5 x 1 = 5 Marks)
Q. No	Question	Marks
1	_____ notation is useful for expressing the lower bound of the complexity function a) O big oh b) Ω big omega c) Θ theta notation d) o little oh	1
2	There are three algorithms A1, A2, A3, A4 to solve the given problem with the order nlogn, \sqrt{n} , and log n respectively. Which one is the correct order of increasing growth? a) log n, \sqrt{n} , nlogn b) log n, nlogn, \sqrt{n} c) nlog n, \sqrt{n} , log n d) \sqrt{n} , nlogn, log n	1
3	How many number of comparison are required in insertion sort if the file is already sorted? a) N b) N-1 c) N+1 d) N^2	1
4	What does the algorithmic analysis count? a) The number of operations that are required to run the program b) The number of lines required by the program c) The number of seconds required by the program to execute	1
5	Counting the average memory needed by the algorithm to solve the given problem with the order log(n), nlog(n), log(log(n)) and $n/\log(n)$ respectively. Which is the best algorithm? a) A1 b) A2 c) A3 d) A4	1

Instructions: Answer any 2 Questions

6	We have a list of pairs ("Ashwin", "82"), ("Sumati", "12"), ("Tanuja", "59), ("Bindu", "45), ("Shabana", "72), ("Vijay", "51), where each pair consists of a student's name and his/her marks in a course. Suggest the suitable sorting algorithm that would take lesser number of swaps and also explain the best- and worst-case scenarios with time complexities.	10	3	1	2	2.2.3
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Part – B	(2 x 10 Marks = 20 Marks)

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Course Outcome (CO) and Bloom's level (BL) Coverage in Questions

BL COVERAGE IN %	CO COVERAGE IN %	BL	3	1	2	2.3.2
BL1	100	100	100	100	100	100
BL2	100	100	100	100	100	100
BL3	100	100	100	100	100	100
BL4	100	100	100	100	100	100
BL5	100	100	100	100	100	100
BL6	100	100	100	100	100	100

BL COVERAGE IN %	
BL	3
BL1	100
BL2	100
BL3	100
BL4	100
BL5	100
BL6	100

CO COVERAGE IN %	
CO	3
CO1	100
CO2	100
CO3	100
CO4	100
CO5	100
CO6	100

Approved by the Audit Professor/Course Coordinator

Test: CLA-T1

Date: 13-02-2023

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Course Articulation Matrix:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO12
CO1	2	3	-	-	-	-	-	-	-	-	-	-
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CO3	-	3	3	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-
CO6	-	2	3	-	-	-	-	-	-	-	-	-

Part – A
(5 x 1 = 5 Marks)

Instructions: Answer all

Q. No.	Question	Marks	BL	CO	PO	PI Code
1	_____ within the limit deals with the behavior of a function for sufficiently large values of its parameter. a) Asymptotic notation b) Big-Oh notation c) Omega notation d) Theta notation	1	1	1	2	2.3.1
2	A _____ is a compact, informal, and environment-independent description of a computer programming algorithm. a) Stack b) Queue c) Pseudocode d) Non-linear	1	1	1	2	2.1.1
3	How many number of passes are required for sorting 8 elements list in bubble sort in the worst case? a) 0 b) 9 c) 8 d) 7	1	2	1	2	2.2.2
4	The time factor when determining the efficiency of algorithm is measured by a) Counting microseconds b) Counting the number of key operations c) Counting the number of statements d) Counting the kilobytes of algorithm	1	2	1	2	2.1.2

5	Which of the following recurrence relations can be used to find the nth fibonacci number? a) $f(n) = f(n) + f(n - 1)$ b) $f(n) = f(n) + f(n + 1)$ c) $f(n) = f(n - 1)$ d) $f(n) = f(n - 1) + f(n - 2)$	1	2	1	2	2.1.3
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Part – B
(2 x 10 Marks = 20 Marks)

Instructions: Answer any 2 Questions

6	Yash wants to buy a phone to his mother. In the shop, the phones are in the unsorted list. He wants to check the phone features based on the price of the adjacent phone. Kindly help him to suggest the comparison-based algorithm which takes a more number of swaps to arrange it in order. The lists are, 50, 25, 5, 20, 10. Also give the best and worst case of this scenario with time complexity.	10	3	1	2	2.2.3
7	Deduce the time complexity of a given relation using Recursion Tree approach. $T(n) = \sum_{i=1}^{\lfloor n/4 \rfloor} T(n/4) + T(n/2) + n^2; n \geq 1$	10	3	1	2	2.3.2
8	(i) Given $f(n) = 3n^2 + 2n + 5$; $g(n) = n^2$. Show that $f(n) = O(g(n))$ and $g(n) = \Theta(f(n))$. (ii) Consider problem P and provide various possible algorithm design techniques to solve the given problem.	5	3	1	2	2.3.2

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Course Outcome (CO) and Bloom's level (BL) Coverage in Questions

BL COVERAGE IN %



CO COVERAGE IN %



Approved by the Audit Professor/Course Coordinator

Test: CLA-T1

Date: 05-04-2022

Course Code & Title: IBCSC204J Design and Analysis of Algorithms

Duration: 1 Hour

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Max. Marks: 25

Course Articulation Matrix:

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CO2	M	H	L	M	L				M	L		H
CO3	M	H	M	H	L				M	L		H
CO4	M	H	M	H	L				M	L		H
CO5	H	H	M	H	L				M	L		H
CO6	L	H	M	H	L				L	L		H

Part - A
 (10 x 1 = 10 Marks)

Instructions: Answer all

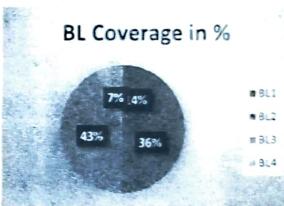
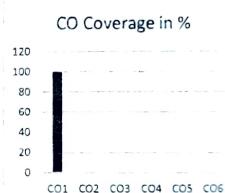
Q. No	Question	Marks	BL	CO	PO	PI Code
1	The best case running time of insertion sort is A. Factorial B. Constant C. Linear D. Exponential	1	1.2	1	2	2.5.3
2	Determine the correct order with respect to computational time (lowest to largest) for the algorithms mentioned below: A. $O(n)$, $O(1)$, $O(\log n)$, $O(2^n)$ B. $O(1)$, $O(\log n)$, $O(n)$, $O(2^n)$ C. $O(2^n)$, $O(n)$, $O(\log n)$, $O(1)$ D. $O(\log n)$, $O(1)$, $O(2^n)$, $O(n)$	1	1.4	1	2	2.6.5
3	Consider $\sum_{i=1}^n i \times f_i$ is equal to A. $n(n+1)/2$ B. $n(n+1)(2n+1)/6$ C. $n^2(n+1)^2/4$ D. $n(n+1)$	1	1.3	1	2	2.8.4

4	The worst case time complexity of an algorithm gives _____ on the running time of an algorithm A. An upper bound B. A lower bound C. A middle bound D. A tight bound	1	L2	1	2	2.5.3
5	Which among the following is not a characteristic of an algorithm? A. Definiteness B. Error C. Uniqueness D. Input	1	L1	1	1	1.6.1
6	The efficiency of an algorithm is determined by A. Time Factor B. Time and Space Factor C. Space Factor D. Memory	1	L2	1	1	1.6.1
7	Which of the following is the notation used for expressing the upper bound of an algorithm? A. Big-O B. Big- Ω C. Little 'o' D. Theta	1	L2	1	2	2.5.3
8	Identify the recurrence equation for the sequence 100,300,900,2700,...? Given $T(0)=100$ A. $T(n) = 3 * T(n-1)$ B. $T(n) = T(n-1) + 300$ C. $T(n) = T(n-1) * 100$ D. $T(n)=T(n-1) * 30$	1	L3	1	2	2.8.1
9	Which of the following is not an algorithm design technique? A. Greedy Approach B. Dynamic Programming C. Forward Method D. Backtracking	1	L1	1	1	1.6.1
10	sum = 0; for(j = 0; i < n; i++) for(j = 0; j < n * n; j++) sum++;	1	L3	1	2	2.5.2

	The running time of the above code is A. $O(n^2)$ B. $O(n/2)$ C. $O(n^3)$ D. $O(n\log n)$					
Part - B (3 x 5 Marks = 15 Marks)						
Instructions: Answer any 3 Questions						
11	Explain the characteristics of a good algorithm	5	1.2	1	1	1.6.1
12	Solve the following recurrence relation using substitution method $T(n) = T(n/2) + 1$, $T(1) = 1$	5	1.3	1	2	2.5.3
13	Solve the following recurrence relation using recursion tree method. $T(n) = 2T(n-1) + 1$, for $n > 1$ and $T(1) = 1$	5	1.3	1	2	2.5.3
14	Derive best case analysis of insertion sort using step count.	5	1.3	1	2	2.6.3

*Program Indicators are available separately for Computer Science and Engineering in MCTE examination reforms policy.

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions



Approved by the Audit Professor/Course Coordinator



Date: 5-04-2022

Test: CLA-T1

Course Code & Title: 18CSC201J- Design and Analysis of Algorithm

Duration: 1 Hour

Year & Sem: II Year / IV Sem

Max. Marks: 25

Course Articulation Matrix: (to be placed)

S.No.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	CO1	L	H	-	H	L	-	-	-	L	L	-	H
2	CO2	M	H	L	M	L	-	-	-	M	L	-	H
3	CO3	M	H	M	H	L	-	-	-	M	L	-	H
4	CO4	M	H	M	H	L	-	-	-	M	L	-	H
5	CO5	H	H	M	H	L	-	-	-	M	L	-	H
6	CO6	L	H	M	H	L	-	-	-	L	L	-	H

Part - A
 $(10 \times 1 = 10 \text{ Marks})$

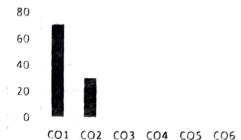
Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	What is the worst-case complexity of bubble sort? a) $O(n\log n)$ b) $O(\log n)$ c) $O(n)$ d) $O(n^2)$	1	1	1	1	1,1,1
2	The given array is $arr = \{1, 2, 4, 3\}$. Bubble sort is used to sort the array elements. How many iterations will be done to sort the array? a) 3 b) 2 c) 1 d) 0	1	4	1	2	1,1,1
3	What is the best case and worst case complexity of ordered linear search? a) $O(n\log n)$, $O(\log n)$ b) $O(\log n)$, $O(n\log n)$ c) $O(n)$, $O(1)$ d) $O(1)$, $O(n)$	1	1	1	1	1,1,1
4	What is the average number of inversions in an array of N distinct numbers while performing bubble sort? a) $N(N-1)/4$ b) $N(N-1)/2$ c) $N(N-1)/2$ d) $N(N-1)/3$	1	3	1	2	1,1,1

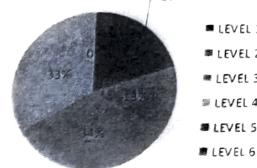
		1	2	1	2	1.1.1
5	What is the running time of an insertion sort algorithm if the input is pre-sorted? a) $O(N^2)$ b) $O(N \log N)$ c) $O(N)$ d) $O(M \log N)$					
6	What is the advantage of recursive approach than an iterative approach? a) Consumes less memory b) Less code and easy to implement c) Consumes more memory d) Easy to test and debug during iteration	1	4	1	1	1.1.1
7	What is the best case time complexity of the binary search algorithm? a) $O(1)$ b) $O(n)$ c) $O(n \log n)$ d) $O(n^2)$	1	4	1	2	1.3.1
8	___ of an algorithm is the amount of time required for it to execute. a. Time complexity b. Space complexity c. Compiling time d. Best case	1	3	1	2	1.1.1
9	___ within the limit deals with the behavior of a function for sufficiently large values of its parameter. a. Asymptotic notation b. Big-Oh notation c. Omega notation d. Theta notation	1	2	1	1	1.1.1
10	<pre>void solve() { string s = "scaler"; int n = s.size(); for(int i = 0; i < n; i++) { s = s + s[i]; } }</pre> Find the time complexity of the above code segment a) $O(1)$ b) $O(n)$ c) $O(n^2)$ d) $O(\log n)$	1	3	1	2	1.3.1
Part – B ($5 \times 3 = 15$ Marks)						
Instructions: Randomly selected three questions. Answer any three Questions						
11	Evaluate the following recurrence relation. $T(n) = 9T(n/3) + 4n^4$, $n \geq 3$	5	3	1	2	1.3.1
12	Solve the recurrence relation using recursion tree. $T(n)=2T(n/2)+cn$	5	4	1	2	1.3.1
13	(i) How to write an efficient algorithm? What are the design techniques to be considered? (3) (ii) Define Theta Notation. Provide its graphical representation. (2)	5	1	1	1	1.1.1
14	Show that the solution of (i) $T(n)=T([n/2])+1$ is $O(\log n)$. (3) (ii) $T(n)=T(n-1)+n$ is $O(n^2)$ use the substitution method (2)	5	3	1	2	1.3.1

*Program Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy. Course Outcome (CO) and Bloom's level (BL) Coverage in Questions

COURSE OUTCOME WISE MARKS DISTRIBUTION



BLOOM'S LEVEL WISE DISTRIBUTION



Approved by the Audit Professor/Course Coordinator

Test: CLA-T1
 Course Code & Title: IBCSC201J- Design and Analysis of Algorithms
 Year & Sem: II Year / IV Sem

Date: 5-04-2022
 Duration: 1 Hour
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Course Articulation Matrix (to be placed)

S.No.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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4	CO4	M	H	M	H	L	-	-	-	M	L	-	H
5	CO5	H	H	M	H	L	-	-	-	M	L	-	H
6	CO6	L	H	M	H	L	-	-	-	L	L	-	H

Part - A
(10 x 1 = 10 Marks)

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PF Code
1	A _____ is much more valuable than a thousand tests. a. Proof of correctness b. Performance measurement c. Profiling d. Debugging	1	2	1	1	1,1,1
2	_____ criteria denote that each step in an algorithm must be such that it can, at least in principle, be done by a person using pencil and paper in a finite amount of time. a. Finiteness b. Definiteness c. Effectiveness d. Ambiguous	1	1	1	1	1,1,1
3	_____ refers to the task of determining how much computing time and storage an algorithm requires. a. Algorithm analysis b. Time analysis c. Space analysis d. Asymptotic Notation	1	1	1	1	1,1,1
4	_____ notation is useful for expressing the lower bound of the complexity function a. O big oh b. Ω big omega c. Θ theta notation d. o little oh	1	2	1	2	1,1,1

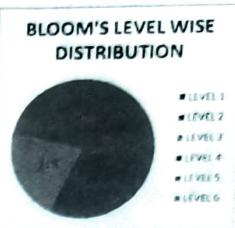
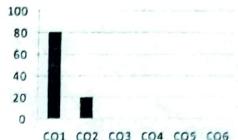
5	___ of an algorithm is the amount of time required for it to execute.	1	2	1	1	1.3.1
a.	Time complexity					
b.	Space complexity					
c.	Compiling time					
d.	Best case					
6	Which one is the correct order of increasing growth?	1	4	2	1	1.3.1
a.	$O(1)$, $O(\log n)$, $O(\log \log n)$, $O((\log n)^2)$					
b.	$O(1)$, $O(\log \log n)$, $O((\log n)^2)$, $O(\log n)$					
c.	$O(1)$, $O(\log n)$, $O(\log \log n)$, $O((\log n)^2)$					
d.	$O(1)$, $O(\log n)$, $O((\log n)^2)$, $O(\log \log n)$					
7	If an algorithm has the running time as a recurrence equation then the algorithm is ___	1	1	1	1	1.1.1
a)	Non-recursive					
b)	Iterative					
c)	Recursive					
d)	Infinite					
8	The measure of the longest amount of time possibly taken to complete an algorithm is expressed as ___	1	2	1	2	1.1.1
a)	Little-O					
b)	Little-Omega					
c)	Big-Omega					
d)	Big-O					
9	What is the best case running time of bubble sort? Choices are the same.	1	3	1	2	1.1.1
a)	$O(N^2)$					
b)	$O(N \log N)$					
c)	$O(N)$					
d)	$O(M \log N)$					
10	What is the best case and worst case time for inorder traversal of balanced binary search tree?	1	4	1	2	1.3.1
a.	$O(\log n)$, $O(n)$					
b.	$O(n)$, $O(\log n)$					
c.	$O(\log n)$, $O(\log \log n)$					
d.	$O(n)$, $O(h)$					

Part – B
(5 x 3 = 15 Marks)

Instructions: Randomly selected three questions. Answer any three Questions

11	Define the terms Best case, Worst case, and Average case time complexities with example	5	1	2	1	1.1.1
12	Solve the recurrence using recursion tree method: $T(1) = 1$ $T(n) = T(n-1) + n \quad n > 0$	5	3	2	4	1.1.1
13	Give short note on the Fundamentals of Algorithmic Problem Solving Discuss the steps involved Bubble sort algorithm with time complexity	5	3	1	2	1.3.1
14	Show that the solution of the recurrence $T(n) = T(n/2) + \lg n$ is $O((\log n)^2)$ using substitution method	5	4	2	2	1.3.1

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