Academic year 2021-2022 (Even Sem)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Date	29th June 2022	Maximum Marks	50
Course Code	18CS43	Duration	120 Min
Sem	IV Semester	Test-I	
DESIGN & ANALYSIS OF ALGORITHMS			

Sl. No.	**PART A**	M	BT	CO
1	In empirical analysis the quadratic efficiency class of the algorithm will have what type of graph	**1**	**2**	**2**
2	State the basic operation in the Tower of Hanoi Problem	**1**	**1**	**1**
3	For an input size of 15 elements, how many times the basic operation will be executed in selection sort.	**1**	**2**	**2**
4	Write the recurrence to denote the worst case of Quicksort	**1**	**2**	**2**
5	The algorithm like Quick sort does not require extra memory for carrying out the sorting procedure. This technique is called _____	**1**	**1**	**1**
6	If $T(n) = 7T(n/3) + n^2$, then by master method T(n) =	**1**	**3**	**2**
7	Find the number of swaps done to sort the following elements in alphabetical order using Bubble Sort **E X A M P L E**	**2**	**3**	**3**

8	What is the time complexity of following code
	`void fun( )`
	`{`
	`for( i=1,i<=n;i++)`
	`for(j=1;j<=i²;j++)`
	`for(k=1;k<=n/2;k++)`
	`sum=sum + a[i][j]*k;`
	`}`
		2	**3**	**3**

	PART B			
1a	Discuss with a neat flow chart the algorithm design and analysis process.	**6**	**2**	**1**
1b	For the algorithm to find the largest element in a list of n numbers, indicate (i) a natural size metric for its inputs (ii) its basic operation (iii) whether the basic operation count can be different for inputs of the same size:	**4**	**3**	**1**
2a	Write a recursive Tower of Hanoi and analyze its efficiency by writing the recurrence relation.	**6**	**3**	**2**
2b	Illustrate the general plan to analyze the efficiency of non-recursive algorithm.	**4**	**1**	**2**
3a	With an algorithm discuss the efficiency of selection sort.	**6**	**2**	**2**

3b	Compare the orders of growth using limits: i) ½ n(n-1) and n^2 ii) n! and 2^n	**4**	**3**	**3**
4a	Write the partition algorithm used in quicksort. Apply the same to sort the elements 5 3 1 9 8 2 4 7. Draw the recursive call tree.	**6**	**3**	**3**
4b	Discuss the efficiency of quicksort.	**4**	**2**	**2**
5a	Apply Strassen's algorithm to compute the matrix multiplication of A1 and B1 matrix. **A1** = $\begin{bmatrix} 3 & 2 \\ 5 & 6 \end{bmatrix}$ **B1** = $\begin{bmatrix} 5 & 6 \\ 1 & 3 \end{bmatrix}$	**6**	**4**	**4**
5b	Write a pseudocode for a divide-and-conquer algorithm for finding the position of the largest element in an array of n numbers.	**4**	**3**	**2**

Course Outcomes:

COURSE OUTCOMES

1. Understand and explore the asymptotic runtime complexity of algorithms by using mathematical relations.
2. Select and apply appropriate design techniques to solve real world problems.
3. Estimate the computational complexity of different algorithms.
4. Apply the efficient algorithm design approaches in a problem specific manner.

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	14	28	14	04	06	20	30	04	-	-

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