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NBA Accredited (UG - 6Years)

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Department of Computer Science and Engineering

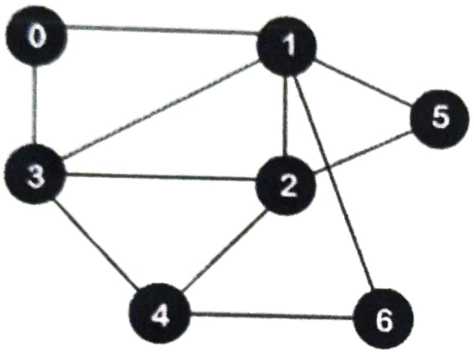
Program: BE

Date	18 June 2024	Maximum Marks	50
Course Code	**CD343AI**	Duration	90 min
4th Sem	IV Semester	CIE-I	

Design and Analysis of Algorithms

(Common to AIML/CSE/CD/CY/ISE)

Sl. No.	Test Questions	M	L	CO
1a	Summarise the framework for analysis of algorithms.	**05**	L1	CO2
1b	With suitable notations and graphs, explain the different asymptotic notations. Give two examples in each case.	**05**	L2	CO1
2a	Design a recursive algorithm to find the sum of cubes of first 'n' natural numbers. Set up a recurrence, solve and determine the time complexity of the algorithm.	**05**	L2	CO1
2b	Write an algorithm to arrange the numbers in ascending order using Selection Sort. Evaluate the time complexity. Compare it with merge-sort algorithm.	**05**	L1	CO3
3a	Sort the following functions in the increasing order of growth. n^3, 2^n, $log_5\, n$, $3n$, $log_2 n$, $\sqrt{n}$, $n \log n$ Indicate how much the functions value will change if its argument is increased four-fold.	**05**	L2	CO2
3b	Write the pseudocode for merge sort and describe the process. Setup a recurrence and decide the time complexity.	**05**	L2	CO1
4a	Apply Master's theorem to following recurrence and indicate the efficiency class. $i.\, T(n) = 2\,T\left(\frac{n}{2}\right) + n$ $ii.\, T(n) = 8\,T\left(\frac{n}{2}\right) + 5n^2$	**04**	L3	CO1
4b	Derive the worst-case efficiency class for the quick sort. Show the first split for the following array by considering the leftmost element as the pivot: 38, 81, 22, 48, 18, 50, 31, 58	**06**	L3	CO2
5a	Mention the 3 variations of decrease-and-conquer and give an example algorithm in each case.	**04**	L1	CO3
5b	Consider the graph shown in Fig 5b. i. Apply DFS algorithm by considering vertex '1' as the source and write the traversal sequence. Show the contents of stack during DFS and also draw the DFS forest.	**06**	L3	CO3

	ii. Apply BFS algorithm by considering vertex '0' as the source. Draw the BFS forest.  Fig 5b			

Course Outcomes

CO1	Apply knowledge of computing and mathematics to algorithm analysis and design
CO2	Analyze a problem and identify the computing requirements appropriate for a solution
CO3	Apply mathematical foundations, algorithmic principles, and computer science theory to the modeling, and evaluation of computer-based solutions in a way that demonstrates comprehension of the trade-offs involved in design choices.
CO4	Investigate and apply optimal design, development principles, skills and tools in the construction of software solutions of varying complexity.
CO5	Demonstrate critical, innovative thinking, and display competence in oral, written, and visual communication.
CO6	Exhibits positive group communication exchanges in order to accomplish a common goal and engage in continuing professional development.

Blooms' taxonomy

L1	L2	L3	L4	L5	L6	CO1	CO2	CO3	CO4	CO5	CO6
14	20	16	-	-	-	19	16	15	-	-	-