



UE18CS251#2522#52

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PES University, Bangalore
(Established under Karnataka Act No. 16 of 2013)

UE17/18CS251**December 2020: END SEMESTER ASSESSMENT (ESA) B.TECH.****UE17/18CS251 – Design and Analysis of Algorithms**

Time: 3 Hours

Answer all questions in the same order

Max Marks: 100

1	a)	Define Algorithm and Explain asymptotic notations with diagram.	6
	b)	Indicate order of growth and prove your assertion Each carries 2 marks 1. $2n \log(n+2)^2 + (n+2)^2 \log n/2$ 2. $3n^2 \log n$ 3. $5^{n+1} + 3^{n-1}$	6
	c)	Write algorithm to count binary digits for a positive decimal number.	5
	d)	Compare order of growth using limits for: $n!$ and 2^n	3
2.	a)	Describe Master theorem. Write recurrence relation for recursive binary search and apply master theorem.	5
	b)	Apply merge sort to sort the given list 12,35,87,26,9,28,7 and mention worst case complexity of merge sort.	5
	c)	Write Quick sort partition algorithm.	5
	d)	Illustrate and Analyze worst case scenario of Quick Sort	5
3.	a)	Describe the variants of decrease and conquer technique. Apply insertion sort for the given input: 5, 2, 4,6,1,3.	7
	b)	Define the term “stable/stability” with respect to sorting algorithm. Apply Heap sort on the given input: 45,36,54,27,63,72,61,18. Give average case time complexity of heap sort.	7
	c)	Define AVL tree and 2-3 tree with an example.	6
4.	a)	Write a note on Red Black Tree with Example.	5
	b)	Apply Horspool’s string matching algorithm to find the Pattern : BARBER in the Text: JIM SAW ME IN A BARBERSHOP	5
	c)	Apply sorting by Distribution Counting on the given input: 12,11,13,12,13,12,13.	5
	d)	$W=8$ is the capacity of the knapsack, weights and values of items are $w = \{2,3,4,5\}$ $p = \{1,2,5,6\}$.	5
5.	a)	Encode the text DAD_ADDED_BED using Huffman coding and probabilities are $A=11, B=6, C=2, D=10, E=7, _=10$	4
	b)	With a neat diagram apply backtrack technique to solve subset problem for the given input $s = \{1,3,4,5\}$ and $d=11$	6
	c)	Define the following with an example: i) Class P ii) Class NP iii) NP-Complete.	6
	d)	Write a note on Branch and Bound Technique.	4