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PES University, Bangalore

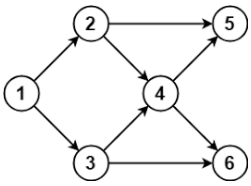
(Established under Karnataka Act No. 16 of 2013)

UE18CS251

END SEMESTER ASSESSMENT (ESA)

UE18CS251- Design and Analysis of Algorithms

Time: 3 Hrs | Answer All Questions | Max Marks: 100

1.	a)	Define *O*, Ω and Θ notations.	6
	b)	Write algorithm to solve the tower of Hanoi problem and derive its efficiency.	6
	c)	Write algorithm for selection sort and derive its efficiency.	8
2.	a)	Write the algorithm for Quick sort and derive the efficiency for the best case.	8
	b)	Write an algorithm to find the smallest element in an array A [0..n-1] using a) Brute force b) Divide and conquer c) Decrease and conquer.	6
	c)	 Write the algorithm for finding topological sequence using DFS. For the above DAG find the topological sequence using DFS based algorithm.	6

3.	a)	Write the algorithm heapify in the code given below to delete the largest element in the maximum heap
		delete_max(H[1..n])
		{
		T=H[1];
		H[1]=H[n]
		heapify(H[1..n-1]) // re creates the heap
		return T
		}
			6

	b)	i) Find the next two permutations using Johnson Trotter algorithm <- <- <- <- -> 4 1 3 2 5 ii) Find the next two permutations using lexicographic algorithm 3 1 9 2 5	6
	c)	Construct a RED BLACK tree by inserting the following numbers in sequence : 2,1,4,5,9,3,6,7	8
4.	a)	Apply Boyer Moore's algorithm to search for the pattern AT_THAT in the text WHICH_FINALLY_HALTS_ _AT_THAT.	10
	b)	Find the solution for the following instance of Knapsack problem using dynamic programming with memory function. (Fill the table cells only if required).	10

Item	1	2	3	4	Capacity W=5
Weight	2	1	3	2	
Value	3	4	5	6	

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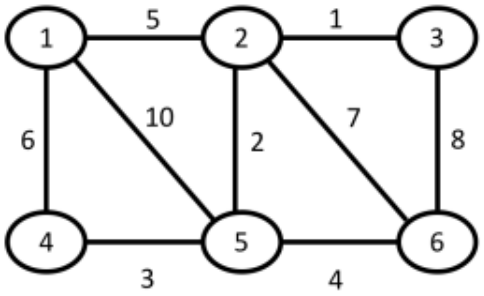
5	a	 Construct a **Maximum spanning tree** using Prims algorithm for the above given graph. (Hint: Negate all the edges and apply Prims algorithm.)	10
	b	Explain in brief the following design strategies a) Greedy Technique b) Backtracking c) Branch and Bound	10