KUMARAGURU
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B.E DEGREE EXAMINATIONS: DEC 2015

(Regulation 2009)

Third Semester

B.E (CSE)

U14CST301: Data Structures and Algorithms

Time: Three Hours	Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In a linked list with n nodes, the time taken to insert an element after an element pointed by some pointer is [K2]

	a)	0 (1)	b)	0 (log n)
	c)	0 (n)	d)	0 (n 1og n)

2. Assertion (A): Stack is used in recursive programs. [K2]
Reason (R): Stack uses first in first out principle.

	a)	Both A and R are individually true and R is the correct explanation of A	b)	Both A and R are individually true but R is not the correct explanation of A
	c)	A is true but R is false	d)	A is false but R is true

3. Assertion (A): A tree contains cycle [K2]
Reason (R): A tree with n nodes contains n-1 edges

	a)	Both A and R are individually true and R is the correct explanation of A	b)	Both A and R are individually true but R is not the correct explanation of A
	c)	A is true but R is false	d)	A is false but R is true

4. The following numbers are inserted into an empty binary search tree in the given order: 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree? [K3]

	a)	2	b)	3
	c)	4	d)	6

5. Match list 1 with list 2 and choose the correct answer using the codes given below [K3]

List 1	List 2
A. B-tree	1. Structure and heap order property
B. AVL tree	2. Reverse polish
C. Heap	3. Balance Factor
D. Postfix	4. 2-3-4 tree

		A	B	C	D
	a)	4	3	1	2
	b)	4	2	3	1
	c)	4	2	1	3
	d)	4	3	2	1

6.	Given the following input (4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199) and the hash function x mod 10, which of the following statements are true? [K3] i. 9679, 1989, 4199 hash to the same value ii. 1471, 6171 has to the same value iii. All elements hash to the same value iv. Each element hashes to a different value			
	a)	i only	b)	ii only
	c)	i and ii only	d)	iii or iv
7.	The number of edges in a minimum spanning tree of a graph with 8 vertices is [K3]			
	a)	7	b)	9
	c)	8	d)	10
8.	The maximum degree of any vertex in a simple graph with *n* vertices is [K2]			
	a)	n–1	b)	n+1
	c)	2n–1	d)	n
9.	Which of the following sorting algorithms does not have a worst case running time of $O(n^2)$? [K2]			
	a)	Insertion sort		Merge sort
	c)	Quick sort		Bubble sort
10.	A sort which relatively passes through a list to exchange the first element with any element less than it and then repeats with a new first element is called. [K2]			
	a)	Insertion sort	b)	Selection sort
	c)	Heap sort	d)	Quick sort.

PART B (10 x 2 = 20 Marks)

[Not more than 40 words]

11.	Compare array implementation of list with linked list implementation [K2]
12.	List any four applications of queue. [K2]
13.	Construct min heap for the following numbers. [K3] 25,30,15,17,8,11
14.	Give an example for threaded binary tree. [K2]
15	What is collision in hashing? List the collision resolution methods. [K2]

16		Show the results of inserting 2,1,4,5,9,3,6,7 into an initially empty AVL tree. [K3]	
17		What is graph? List the graph representation methods. [K2]	
18		List the applications of depth first search. [K2]	
19		Compare internal and external sorting methods. [K2]	
20.		What is the worst and average case time complexity of sequential search? [K2]	
		PART C (5 x 14 = 70 Marks) **[Not more than 400 words]**	
21.	a)	Explain queue and its operations. Develop functions to implement all queue operations using doubly link list. [K2]	10
		Evaluate the following postfix expression using stack. [K3] AB^CD-EF/GH+/+* Show the stack contents at each stage.	4
22.	a)	Develop functions to implement the following [K2] • To insert an element in the binary search tree • To delete an element from the binary search tree • To search an element in the binary search tree.	5 5 4
		OR	
	b)	Write short notes on threaded binary trees. [K2]	7
		Develop algorithms to implement tree traversal techniques. [K2]	7
23.	a)	Explain height balanced trees with examples. Write an algorithm to perform an operation balanced insert. [K2]	14
		OR	
	b)	What do you mean by separate chaining hash table? Write an algorithm for find and insert operations on the separate chaining hash table. [K2]	7
		Show the result of inserting the keys F, S, Q, K, C, L, H, T, V, W, M, R, N , P, A, B, X, Y, D, Z, E in the order to an empty B-tree of degree-3 [K3]	7
24.	a)	Write an algorithm for finding single source shortest path. Explain with an example. [K2]	10
		With an example explain topological sort [K2]	4
		OR	
	b	What is a spanning tree of a graph? Write and explain Prim's algorithm to find the minimum spanning tree with an example graph. [K2]	10
		What do you mean by biconnectivity? Explain with example. [K2]	4
25	a)	Write an algorithm for quick sort. Sort the following numbers using quick sort	7

		5,3,1,9,8,2,4,7 [K2]	
		Write a recursive algorithm for binary search and explain with example. [K2]	7
		OR	
	b)	Discuss in detail about the following [K2] • Multiway Merge • Polyphase Merge • Replacement Selection	7 7