Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: CS205

Course Name: DATA STRUCTURES (CS,IT)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

			Marks
1		Write a recursive function to find the fibonacci series	(3)
2		Draw a circular doubly linked list. Give an advantage of circular doubly linked list.	(3)
3		Check whether the following is true or not. 2^{n+1} is in $O(2^n)$. Give reason.	(3)
4		How will you represent a polynomial $3x^2 + 2xy^2 + 5y^3 + 7yz$ using singly linked list?	(3)

PART B

Answer any two full questions, each carries 9 marks.

5	a)	Explain the Big O asymptotic notation used for specifying the growth rate of functions.	(3)
	b)	Given a doubly linked list, write an algorithm that removes a node with a particular value from the list and inserts it in the front.	(6)
6	a)	What is an algorithm? How is its complexity analysed?	(3)
	b)	What is thecomplexity of finding maximum and minimum value from an array of n values? Explain the steps of deriving complexity.	(6)
7	a)	Give any three applications of linked list.	(3)
	b)	Let L1 be a singly linked list in memory. Write an algorithm i) Finds the number of non zero elements in L1 ii) Adds a given value K to each element in L1	(6)

PART C

Answer all questions, each carries 3 marks.

8	Write an algorithm to find a substring in a given string.	(3)
9	With the help of an example, explain how a binary tree can be represented using an array.	(3)
10	How can you reverse a string using stack? Give one example and show how you can reverse a given string using stack.	(3)
11	Write a recursive algorithm for pre-order traversal in a binary tree.	(3)

PART D

Answer any two full questions, each carries 9 marks.

12	a)	Illustrate the result of each operation in the sequence PUSH(S,4), PUSH(S,1), PUSH(S,3), POP(S), PUSH(S,8) and POP(S) on an initially empty stack S stored in array S[1..6]	(3)
	b)	Write an algorithm to insert an element into a binary search tree.	(6)
13	a)	Convert the following infix expression into prefix expression (A-B/C) * (D*E-F)	(3)
	b)	Write an algorithm to evaluate a postfix expression.	(6)
14	a)	In a complete binary tree of depth d (complete including last level), give an expression to find the number of leaf nodes in the binary tree.	(3)
	b)	Given five memory partitions of 300Kb, 700Kb, 400Kb, 500Kb, 800Kb (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 412 Kb, 617 Kb, 112 Kb, and 626 Kb (in order)?	(6)

PART E

Answer any four full questions, each carries 10 marks.

15	a)	What are the characteristics of a good hash function?	(4)
	b)	Demonstrate the insertion of the keys 5, 28, 15, 20, 33, 12, 17, 32 into a hash table with collisions resolved by linear probing. Let the table have 9 slots, with the starting index 0. Let the hash function be h(k) = k mod 9	(6)
16	a)	Give the heap sort algorithm. Write the complexity of your algorithm.	(4)
	b)	Using the above heap sort algorithm sort the input file [35 15 40 1 60].	(6)
17	a)	What is Primary Clustering?	(4)
	b)	Given input keys {1, 3, 23, 9, 4, 29, 19} and a hash function h(X) = X mod tablesize. The initial hash table contains 10 slots, with starting index 0. Show the resulting table after rehashing when the load factor= 0.5, using linear probing	(6)
18	a)	Give a non recursive algorithm for binary search.	(4)
	b)	Suppose an array contains elements {10, 13, 21, 32, 35, 44, 55}. Give the steps to find an element "35" using i) linear search ii) binary search	(6)
19	a)	Give two different types of representation for graphs.	(4)
	b)	Write a procedure to do DFS in a graph.	(6)
20	a)	Write an algorithm to perform selection sort in an array.	(4)
	b)	Using the above selection sort algorithm, sort the input file [25, 7, 46, 11, 85].	(6)

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