Program: Information Technology
Curriculum Scheme: **Rev2019**
Examination: **SE** Semester **III**
Course Code: ITC302 and Course Name: **DSA**

Time: 2 hour   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	An algorithm that calls itself directly or indirectly is known as
Option A:	Recursive
Option B:	Traversal
Option C:	Conditional
Option D:	Looping
2.	Function call and return process can be easily tested using _____ data structure?
Option A:	Tree
Option B:	Queue
Option C:	Stack
Option D:	Graph
3.	There might be no null links in the _____ linked list
Option A:	Singly
Option B:	Double
Option C:	Circular
Option D:	Priority
4.	If a queue is implemented with a linked list, keeping track of a front node and a rear node with two reference variables. Which of these reference variables will change during an insertion into an NON-EMPTY queue ?
Option A:	Front
Option B:	Rear
Option C:	Both Front and Rear
Option D:	Neither Front nor Rear
5.	The five items: A, B, C, D and E are pushed in stack, one after the other starting from A. Then we popped four items and each element is inserted in a queue. Then three elements are deleted from the queue and pushed back on the stack. Now one item is popped from the stack. The popped item is ___.
Option A:	B
Option B:	C
Option C:	D
Option D:	E
6.	Convert the infix to postfix for A-F/(B+C)*(D/E)

Option A:	A F B + C / D E / * -
Option B:	A F B C + / D / E - *
Option C:	A F + / B C D E / * -
Option D:	A F B C + / D E / * -
7.	Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?
Option A:	Deleting a node whose location is given
Option B:	Searching of an unsorted list for a given item
Option C:	Inserting a node after the node with given location
Option D:	Traversing a list to process each node
8.	Construct an AVL tree with the following values: 15, 20, 24, 10, 13, 7, 30, 36, 25. Give the preorder traversal of AVL Tree constructed.
Option A:	7,10,13,20,24,15,25,30,36
Option B:	13,10,7,24,20,15,30,25,36
Option C:	7,10,13,25,20,24,15,36,30
Option D:	7,10,20,25,15,24,36,30,13
9.	What is an AVL tree?
Option A:	a tree which is balanced and is a height balanced tree
Option B:	a tree which is unbalanced and is a height balanced tree
Option C:	a tree with at least three children
Option D:	a tree with at most three children
10.	Why we need to balance height of binary tree?
Option A:	to avoid formation of skew trees
Option B:	to save memory
Option C:	to attain faster memory access
Option D:	to simplify storing
11.	A Text consists of the letters A, B, C and D. The probability of occurrence is $P(A) = 0.4$, $P(B) = 0.1$, $P(C) = 0.2$ and $P(D) = 0.3$. The Huffman code is:
Option A:	A = 0, B = 111, C = 11, D = 101
Option B:	A = 0, B = 11, C = 10, D = 111
Option C:	A = 0, B = 111, C = 110, D = 10
Option D:	A = 01, B = 111, C = 110,D = 10
12.	Adjacency List and Adjacency Matrix are the two representations of graph. What among these is true
Option A:	Lists require more space than matrices but are faster to find the weight of an edge (v1, v2)
Option B:	Lists require more space than matrices and they take longer to find the weight of an edge (v1, v2)
Option C:	Lists require less space than matrices and they are faster to find the weight of an edge (v1, v2)
Option D:	Lists require less space than matrices but take longer to find the weight of an edge (v1,v2)
13.	The maximum degree of any vertex in a simple graph with 'N' vertices is

Option A:	N
Option B:	N+1
Option C:	N-1
Option D:	2N+1
14.	What will be the order in which the vertices can be traversed if BFS is applied on the graph, starting from the vertex 'b'?
Option A:	b a h c e f d g
Option B:	b a c h e d f g
Option C:	b c a h e d f g
Option D:	b c h e a d f g
15.	Linear searching is used when
Option A:	the list has only a few elements
Option B:	performing a single search in an unordered list
Option C:	the list has only a few elements and when performing a single search in an unordered list
Option D:	none of these
16.	Given the following input (432, 133, 147, 967, 198, 617, 619, 419) and the hash function x mod 10, which of the following statements are true? i. 147,967,617 hash to the same value. ii. 619,419 hash to the same value. iii. All elements hash to the same value iv. Each element hashes to a different value
Option A:	i & ii both
Option B:	ii & iii both
Option C:	ii only
Option D:	i and ii both
17.	If several elements are competing for the same bucket in the hash table, what is it called?
Option A:	Diffusion
Option B:	Replication
Option C:	Collision
Option D:	Reduction
18.	Hash function h(k)=k mod 10 is used for hash table of size 10, and linear probing for collision solving. How many collisions occurred in all while inserting 46, 34, 42, 23, 52, and 33 in the table?
Option A:	7
Option B:	5
Option C:	6
Option D:	4

19.	The number of edges from the node to the deepest leaf is called _____ of the tree.
Option A:	Depth
Option B:	Length
Option C:	Breadth
Option D:	Height
20.	The OS of a computer may periodically collect all the free memory space to form contiguous block of free space. This is called
Option A:	Concatenation
Option B:	Garbage Collection
Option C:	Collision
Option D:	Dynamic Memory Allocation

Q2 (20 Marks)	Solve any Two Questions out of Three	10 marks each

A	What is a doubly linked list? Write a C function for following operation in DLL:
	    i. Insertion at the end
	    ii. Insertion at the beginning
	    iii. Insertion at a position	

B	Explain Collision Handling techniques with examples.	
C	Explain Recursion type with ecample.	

Q3 (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	Explain AVL Tree and solve the example.	
B	Explain minimum spanning Tree Algorithm with the help of exmple.	
C	What are expression trees? What are its advantages? Construct the expression tree for the following algebraic expression using stack: $((a - (b*c)) / ((d*e) + f))^2$	