Reg. No.															

Question Paper Code	14605

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Third Semester

Electronics and Instrumentation Engineering

20ESIT301 - DATA STRUCTURES AND ALGORITHMS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	If the characters 'D','C','B','A' are placed in a queue (in that order), and then removed one at a time, in what order will they be removed? a) ABCD b) ABDC c) DCBA d) DCBA	1	K1	CO1
2.	The postfix form of A*B+C/D is? a) *AB/CD+ b) AB*CD/+ c) A*BC+/D d) ABCD+/*	1	K1	CO1
3.	Translate the following infix expression to prefix form: ((C * 2) + 1) /(A + B) a) A B + 1 2 C * + / b) / + * C 2 1 + A B c) / * + 1 2 C A B + d) none of the above	1	K2	CO1
4.	Which of the following is false about a doubly linked list? a) We can navigate in both the directions b) It requires more space than a singly linked list c) The insertion and deletion of a node take a bit longer d) Implementing a doubly linked list is easier than singly linked list	1	K1	CO2
5.	Given two statements: (i) Insertion of an element should be done at the last node in a circular list (ii) Deletion of an element should be done at the last node of the circular list a) Both are true b) Both are False c) First is false and second is true d) None of the above	1	K1	CO2
6.	Infer which Linked list is considered as an example of _____ type of memory allocation. a) Dynamic b) Static c) Compile time d) Heap	1	K2	CO2
7.	To represent hierarchical relationships between elements, which data structure is suitable? a) De queue b) Priority c)Tree d) Graph	1	K1	CO3
8.	A B-tree of order 4 and of height 3 will have a maximum of _____keys. a) 255 b) 63 c) 127 d)188	1	K1	CO3

9.	Summarize suppose we have numbers between 1 and 1000 in a binary search tree and want to search for the number 363. Which of the following sequence could not be the sequence of the node examined a) 2, 252, 401, 398, 330, 344, 397, 363 b) 924, 220, 911, 244, 898, 258, 362, 363 c) 925, 202, 911, 240, 912, 245, 258, 363 d) 2, 399, 387, 219, 266, 382, 381, 278, 363	*1*	*K2*	*CO3*
10.	A graph is represented as: a) G = (V, E) b) G = (E, V) c) G = (V + E) d) G = (V – E)	*1*	*K1*	*CO4*
11.	Topological order is possible only if the graph is: a) Cyclic b) Weighted c) Acyclic d) Complete	*1*	*K1*	*CO4*
12.	Infer which traversal algorithm is commonly used for exploring vertices in a directed acyclic graph (DAG)? a) Breadth-first search (BFS) b) Dijkstra's algorithm c) Kruskal's Algorithm d) Depth-first search (DFS)	*1*	*K2*	*CO4*
13.	Dijkstra's algorithm finds: a) MST b) Shortest path c) Cycle d) Sorting	*1*	*K1*	*CO5*
14.	Find a Application of graphs includes: a) Cooking b) Networking c)Painting d) Writing	*1*	*K1*	*CO5*
15.	show the Open addressing resolves collision: a) Using linked list b) Deleting element c) Finding another empty slot d) Sorting data	*1*	*K2*	*CO5*
16.	Infer a hash function maps keys to: a) Values b) Lists c) Indexes d) Trees	*1*	*K2*	*CO5*

PART – A (ii) (Short Answer Questions)
(8 × 3 = 24 Marks)
Answer ALL Questions

17.	Describe the applications of stacks in real-world problems.	*3*	*K2*	*CO1*
18.	Illustrate Queue ADT.	*3*	*K3*	*CO1*
19.	Summarize the differences between linear and non-linear data structures.	*3*	*K2*	*CO2*
20.	Develop linked list operations to insert an element at beginning and end.	*3*	*K3*	*CO2*
21.	Apply different types of tree traversals in a tree.	*3*	*K3*	*CO3*
22.	Explain Depth First Traversal (DFS).	*3*	*K2*	*CO4*
23.	Apply topological sorting to a directed acyclic graph (DAG).	*3*	*K3*	*CO4*
24.	Build a linear search procedure to find an element in a given list.	*3*	*K3*	*CO5*

PART - B (Descriptive Answer Questions)
(5 × 12 = 60 Marks)
Answer ALL Questions

25.	a)	Apply the algorithm that implements the stack ADT. Explain any one application of the stack.	*12*	*K3*	*CO1*
		OR			
	b)	Illustrate about various types of Queue data structure with its basic operations.	*12*	*K3*	*CO1*

26.	a)	Develop a C program for linked list implementation of list.	*12*	*K3*	*CO2*
		OR			
	b)	Interpret the operations of a circular linked list with suitable examples.	*12*	*K3*	*CO2*
27.	a)	Build a Binary Search Tree and demonstrate insertion, deletion, and traversal operations.	*12*	*K3*	*CO3*
		OR			
	b)	Construct AVL trees by performing insertions and show how balancing is achieved.	*12*	*K3*	*CO3*
28.	a)	Develop Kruskal's Algorithm to find the Minimum Spanning Tree for the given graph. Sort the edges and show how cycles are avoided during selection.	*12*	*K3*	*CO4*
		OR			
	b)	Apply the concepts of Euler circuit and Euler graph to determine whether the graph has an Euler circuit with an example.	*12*	*K3*	*CO4*
29.	a)	Select suitable searching algorithms such as Linear Search and Binary Search for finding elements in a dataset and compare their time complexities.	*12*	*K3*	*CO5*
		OR			
	b)	Choose open addressing and separate chaining methods of collision resolution in hashing by using suitable examples.	*12*	*K3*	*CO5*