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GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

B.C.A (Second Semester) Regular Examinations, May – 2025

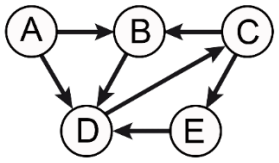
BCA23201 – Data Structures

(BCA)

Time: 3hrs | Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	Show that $n^2 + 50n = O(n^2)$.	CO1	K2
b.	List four benefits of using Insertion Sort.	CO2	K1
c.	Define a doubly linked list with suitable diagram.	CO3	K2
d.	Consider the graph given below and show its adjacency list in memory. 	CO4	K3
e.	Write short notes on linear probing.	CO5	K2

PART – B **(10 x5=50 Marks)**

Answer ***ALL*** questions		Marks	CO #	Blooms Level
2. a.	List the different types of operations performed in an array. Write algorithms for insertion and deletion in an array.	5	CO1	K3
b.	Write an algorithm to implement insertion and deletion in a queue. Explain the conditions for queue overflow and underflow.	5	CO1	K3
	(OR)			
c.	Consider a 20x5 2D array A with its base address = 1000 and the size of an element = 2. Compute the address of the element A[18][4] in row and column major order.	5	CO1	K2
d.	Convert the following infix expression into postfix expression using stack. A – (B / C + (D % E * F) / G) * H	5	CO1	K2
3.a.	Sort the following elements using merge sort. 77, 49, 25, 12, 9, 33, 56, 81	5	CO2	K3
b.	Sort the array given below using selection sort.	5	CO2	K3

39	9	81	45	90	27	72	18

(OR)

c.	Write an algorithm to search an element in an array using binary search.	5	CO2	K3
d.	Explain the Bubble Sort technique for sorting an array. Write the algorithm to implement Bubble Sort.	5	CO2	K3
4.a.	Define a doubly linked list with suitable diagram. Explain the differences between singly and doubly linked lists concerning their structure, operations, and advantages.	5	CO3	K2
b.	Illustrate an algorithm to search for a value in an existing linked list.	5	CO3	K3

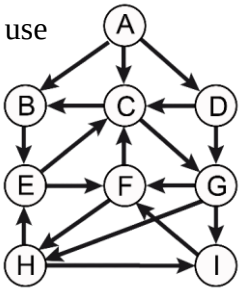
(OR)

c.	Illustrate an algorithm to insert an element at the beginning of a linked list.	5	CO3	K3
d.	Explain the algorithm to delete a node from the end of a singly linked list.	5	CO3	K3
5.a.	Create a binary search tree with the input given below and show all the steps. 98, 2, 48, 12, 56, 32, 4, 67, 23, 87, 77, 55, 46, 10 Provide the sequence of nodes that will be visited using: i. In-order traversal ii. Pre-order traversal iii. Post-order traversal	10	CO4	K4

(OR)

b.	Construct an AVL tree using the following sequence. 16, 27, 9, 11, 36, 54, 81, 63, 72, 45	10	CO4	K4
6.a.	Consider a hash table of size 10. Using linear probing, insert the keys 72, 27, 36, 24, 63, 81, 92, and 101 into the table.	5	CO5	K3
b.	Insert the keys 7, 24, 18, 52, 36, 54, 11, and 23 in a chained hash table of 9 memory locations. Use h(k) = k mod m.	5	CO5	K3

(OR)

c.	Consider the graph G given below. Suppose we want to print all the nodes that can be reached from node H. One alternative is to use a depth-first search of G starting at node H.  	5	CO5	K4
d.	Explain the characteristics of a good hash function. Highlight the key difference between open addressing and chaining in hashing.	5	CO5	K3

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