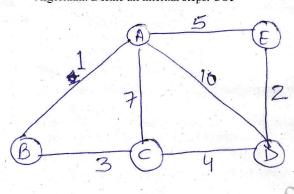
7-a. 🥬	Define Binary Tree. Explain Array Representation of Binary tree. Also explain different operation that can be performed on Binary tree. CO4			
7-b.	Create the binary search tree using the following data elements: CO4 43, 10, 79, 90, 12, 54, 11, 9, 50. Also show steps.	10		
8. Ansv	ver any one of the following:-	10		
8-a.	Discuss direct access file organization. List out the advantages and disadvantages of direct access in file organization. CO5			
8-b.	Find Minimum Spanning Tree (MST) of the following graph using Kruskal's Algorithm. Define all internal steps. CO5	10		

OR MINITOR

Printe	d Page	e:- 04	Subject Code:- AMICSE0301
			Roll. No:
		OF PAGINET	DING AND TECHNOLOGY GREATER NOIDA
NO	IDA I	NSTITUTE OF ENGINEE	RING AND TECHNOLOGY, GREATER NOIDA itute Affiliated to AKTU, Lucknow)
		(An Autonomous mist	M.Tech (Integrated)
		SEM: III - THEORY	Y EXAMINATION (2023 - 2024)
962,		Subje	et: Data Structures
Tim	e: 3 H		Max. Marks: 100
Gener	al Inst	tructions:	1. handate
IMP:	Verify	that you have received the q	uestion paper with the correct course, code, branch etc.
1. Thi.	s Ques	tion paper comprises of thre	e Sections -A, B, & C. It consists of Multiple Choice
Quest	ions (N	ACQ's) & Subjective type qu	estions. indicated on right -hand side of each question.
2. Ma.	ximum	marks for each question are your answers with neat sketc	that wherever necessary.
3. Illu	strate j	your answers with neat sketc titable data if necessary.	ind wherever hooses. J.
5 Pro	forably	write the answers in seaue	ntial order.
6. No	sheet s	should be left blank. Any wri	tten material after a blank sheet will not be
evalue	ated/ch	necked.	
			20
	rion-		
1. Att		ıll parts:-	swither on ourself COL
1-a.	Se	elect the option that best desc	ribes all allay. COI
	(a)	A data structure that shows	
	(b)	Container of objects of sin	
	(c)	Arrays are immutable once	initialised
	(d)	Array is not a data structur	
1-b.	Se	elect the option that describe	the length of the array, if first index is pointed by i 1
	ar	nd last index is pointed by j.	CO1
	(a)	length of array is i+j	
	(b)	length of array is j-i-1	
	(c)	length of array is j-i	
	(d)	length of array is j-i+1	
1-c.		Here is an infix expression: 4	+3*(6*3-12). Suppose that we are using the usual 1
1-0.	et	tack algorithm to convert the	e expression from infix to postfix notation. The
	n	naximum number of symbol	s that will appear on the stack AT ONE TIME during
	tl	he conversion of this express	sion. CO2
	(a)	1	
	(b)	2	
	(b) (c) (d)	2 3 4	

(a) Enque (b) Insert (c) Push (d) Pop  1-e. In a circular linked list. CO3 (a) Components are all linked together in some sequential manner (b) There is no beginning and no end (c) Components are arranged hierarchically (d) Forward and backward traversal within the list is permitted  1-f. Linked lists are not suitable to for the implementation of CO3 (a) Insertion sort (b) Radix sort (c) Polynomial addition (d) Binary search  2.b. Write the overflow condition in circular queue. CO2 2.c. Differentiate between array and linked list. CO3 2.d. Write the difference between height of binary tree and depth of binary tree. CO4 2.e. Write the possible number of edges in a complete graph if number of nodes are 10. CO5  3. Answer any five of the following:- 3-a. Given the base address of an array A[13001900][-55] as 1020 and the size of each element is 2 bytes in the memory, find the address of A[1700][2] in (i)  Row major order and (ii) column major order. CO1  3-b. Define a sparse matrix. Suggest a space-efficient representation for space matrices. CO1  3-c. Define Recursion. Write a python program to calculate factorial of number using recursive functions. CO2	1-d.	Process of inserting an element in the stack is called. CO2	1	2.a.	Differentiate between linear data structure and non-linear data structure. CO1		
b) Insert  (c) Push  (d) Pop  1.e. In a circular linked list. CO3  (a) Components are analytic linked list. CO3  (d) Components are analytic linked list. CO3  (e) Components are analytic linked list. CO3  (f) Foreward and backward traversal within the list is permitted  (g) Foreward and backward traversal within the list is permitted  (g) Foreward and backward traversal within the list is permitted  (g) Foreward and backward traversal within the list is permitted  (g) Foreward and backward traversal within the list is permitted  (g) Foreward and backward traversal within the list is permitted  (g) Foreward and backward traversal within the list is permitted  (g) Radix sort  (g) Radix sort  (g) Radix sort  (g) Pop-manial addition  (g) Binary search  (g) Pop-manial addition  (g) Binary search  (g) Pop-manial addition  (g) Radix sort  (g) Radix sort  (g) Pop-manial addition  (g) Radix sort  (g) Radix sort  (g) Pop-manial addition  (g) Radix sort  (g) Radix sort  (g) Pop-manial addition  (g) Radix sort  (g) Ra		(a) Enque		2.b.			
2.4. Write the difference between height of binary tree and depth of binary tree. CO4  1. In a circular linked list. CO3  1. In a circular linked list. CO3  2. Write the possible number of edges in a complete graph if number of nodes are 10.  3. Components are all linked together in some sequential manner  (b) There is no beginning and no end  (c) Components are arranged hierarchically  (d) Forward and backward nat wersal within the list is permitted  1. Linked lists are not suitable to for the implementation of		(b) Insert					
1-1. In a direction finded list. CO3   1   2   2   2   2   2   2   2   2   3   3							
COS		(d) Pop					
3. Answer any five of the following:  5. Components are arranged hierarchically  6. Forward and backward traversal within the list is permitted  6. Forward and backward traversal within the list is permitted  6. Instead lists are not suitable to for the implementation ofCO3	1-e.	In a circular linked list. CO3	1				
(e) Components are arranged hierarchically (d) Forward and backward traversal within the list is permitted  1-f. Linked lists are not suitable to for the implementation of				SECT	TON-B	3	
(d) Forward and backward traversal within the list is permitted  1-f. Linked lists are not suitable to for the implementation of		(b) There is no beginning and no end		3. Ans	3. Answer any <u>five</u> of the following:-		
of each element is 2 bytes in the memory, find the address of A[1700][2] in (i)  Linked lists are not suitable to for the implementation of				3-a.	Given the base address of an array A[13001900][-55] as 1020 and the size		
Sacrossis   Sacr					of each element is 2 bytes in the memory, find the address of A[1700][2] in (i)		
b) Radix sort  c) Polynomial addition  d) Binary search  1-g. In a full binary tree if number of internal nodes is n, then total number of nodes N are. CO4  (a) N = 2*n  (b) N = n + 1  (c) N = n - 1  (d) N = 2*n + 1  1-h. In what tree, for every node the height of its left subtree and right subtree differ at least by one? CO4  (a) Binary search  (b) AVI. tree  (c) Threaded binary tree  (d) Complete tree  (d) Complete tree  (d) Complete tree  (e) Simple Graph  (e) Simple Graph  (f) A graph with all vertices having equal degree is known as a CO5   1   25-b. Discuss the representation of polynomials of a single variable using a linked list. Write the python functions to add two such polynomials represented by a linked list. CO2  6. Answer any one of the following:  6. A leaf  (b) Adjacency list  (c) Perinem tyrete. CO2  3-c. Define Recursion. Write a python program to calculate factorial of number using recursive functions. CO2  3-c. Define Recursion. Write a python program to calculate factorial of number using recursive functions. CO2  3-c. Define Recursion. Write a python program to calculate factorial of number using recursive functions. CO2  3-c. Define Recursion. Write a python program to calculate factorial of number using recursive functions. CO2  3-c. Define Recursion. Write a python program to calculate factorial of number using recursive functions. CO2  3-c. Define Recursion. Write a python groded used used. Also write the concept of minimum code in a singly linked list. CO3  3-c. Write a function to delete a given node in a singly linked list. CO3  3-c. Write a function to delete a given node in a singly linked list. CO3  3-c. Write a function to delete a given node in a singly linked list. CO3  3-c. Write a function to delete a given node in a singly linked list. CO3  3-c. Write a function to delete a given node in a singly linked list. CO3  3-c. Write a function to delete a given node in a singly linked list coa complete binary tree. CO4  3-c. Explain non-linear data structure in detail with ex	1-f.	Linked lists are not suitable to for the implementation of CO3	1				
d) Binary search   Find full binary tree if number of internal nodes is n, then total number of nodes N   1   3-d. Define Priority queue. Write all possible applications where priority queue can be used. Also write the condition of underflow and overflow of priority queue. CO2   3.e. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Write a function to delete a given node in a singly linked list. CO3   6. Answer any one of the following:				3-b.	Define a sparse matrix. Suggest a space-efficient representation for space matrices. CO1	(	
1-g. In a full binary tree if number of internal nodes is n, then total number of nodes N 2 are. CO4  (a) N = 2*n (b) N = n + 1 (c) N = n - 1 (d) N = 2*n + 1  1-th. In what tree, for every node the height of its left subtree and right subtree (d) Threaded binary tree (e) Threaded binary tree (d) Complete tree (e) Threaded binary tree (d) Complete tree (e) Threaded binary tree (d) Complete Graph  1-j. A vertex with degree one in a graph in called CO5 (a) A leaf (b) Adjacency list (c) Pendent vertex (d) None of these  1 and full binary tree if number of internal nodes is n, then total number of nodes N 1 as 3-d. Define Priority queue. Write all possible applications where priority queue can be used. Also write the condition of underflow and overflow of priority queue. CO2 3.c. Write a function to delete a given node in a singly linked list. CO3  3.f. Mention differences among strictly binary tree, complete binary tree and almost complete binary tree. CO4  3.g. Explain the concept of minimum cost in graph data structure. What is its use? CO5  4. Answer any one of the following:  4. Answer any one of the following:  5. Answer any one of the following:  6. A speak provide the height of its list. CO3  6. Answer any one of the following:  6. Answer a				3-c.			
3.e. Write a function to delete a given node in a singly linked list. CO3  3.f. Mention differences among strictly binary tree, complete binary tree, conference of the binary tree	1-g.	In a full binary tree if number of internal nodes is n, then total number of nodes N	. 1	3-d.	Define Priority queue. Write all possible applications where priority queue can be used. Also write the condition of underflow and overflow of priority queue. CO2		
b) N = n + 1 (c) N = n - 1 (d) N = 2*n + 1  1-h. In what tree, for every node the height of its left subtree and right subtree differ at least by one? CO4  (a) Binary search tree (b) AV tree (c) Threaded binary tree (d) Complete tree  1-i. A graph with all vertices having equal degree is known as a CO5   1 (a) Mutil Graph (b) Regular Graph (c) Simple Graph (d) Complete Graph  1-j. A vertex with degree one in a graph in called CO5   1 (a) A leaf (b) Adjacency list (c) Pendent vertex (d) None of these		(a) $N = 2*n$		3.e.	Write a function to delete a given node in a singly linked list. CO3		
3.g. Explain the concept of minimum cost in graph data structure. What is its use? CO5 of differ at least by one? CO4  4. Answer any one of the following:-  5. Answer any one of the following:-  6. A graph with all vertices having equal degree is known as a CO5 of the complete Graph  6. Simple Graph  6. Complete Graph  6. A leaf  6. A leaf  6. A leaf  6. A complete Graph  6. A leaf  6. A		(b) $N = n + 1$		3.f.		•	
1-h. In what tree, for every node the height of its left subtree and right subtree differ at least by one? CO4  (a) Binary search tree (b) AVL tree (c) Threaded binary tree (d) Complete tree (d) Complete tree  1-i. A graph with all vertices having equal degree is known as a CO5   1   5-a. Explain nor-linear data structure in detail with example. CO1   10   10   10   10   10   10   10				3.g.	Explain the concept of minimum cost in graph data structure. What is its use? CO5		
differ at least by one? CO4  4. Answer any one of the following:-  4-a. Explain non-linear data structure in detail with example. CO1  4-b. Write program in python to multiply two matrices. Order of matrices must be entered by user at run time. CO1  5. Answer any one of the following:-  6. Answer any one of the following:-  7. A graph with all vertices having equal degree is known as a CO5   1   5-a. Explain the advantages and disadvantages of Single Circular linked List. Write the python function to insert a number in the beginning of single circular linked list. CO2  6. Answer any one of the following:-  8. A graph with all vertices having equal degree is known as a CO5   1   5-a. Explain the advantages and disadvantages of Single Circular linked List. Write the python function to insert a number in the beginning of single circular linked list. CO2  8. Discuss the representation of polynomials of a single variable using a linked list. CO2  8. A vertex with degree one in a graph in called CO5   1   6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  8. A leaf  8. A leaf  9. A vertex with degree one in a graph in called CO5   1   6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  8. Discuss the representation of polynomials represented by a linked list. CO2  8. Answer any one of the following:-  8. A vertex with degree one in a graph in called CO5   1   6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  8. Discuss the representation of polynomials represented by a linked list. CO2  8. Answer any one of the following:-  8. A leaf  9. Discuss the representation of polynomials of a single variable using a linked list. CO2  6. Answer any one of the following:-  8. Explain non-linear data structure in detail with example. CO1  8. A leaf  9. Discuss the representation of polynomials of a single variable using a linked list. CO2  6. Answer any one of the fo	1-h.						
4-a. Explain non-linear data structure in detail with example. CO1  (b) AVL tree (c) Threaded binary tree (d) Complete tree  1-i. A graph with all vertices having equal degree is known as a CO5 1  (a) Muttli Graph (b) Regular Graph (c) Simple Graph (d) Complete Graph  1-j. A vertex with degree one in a graph in called CO5 (a) A leaf (b) Adjacency list (c) Pendent vertex (d) None of these  4-a. Explain non-linear data structure in detail with example. CO1  4-b. Write program in python to multiply two matrices. Order of matrices must be entered by user at run time. CO1  5-Answer any one of the following:-  5-a. Explain the advantages of Single Circular linked List. Write the python function to insert a number in the beginning of single circular link list. CO2  5-b. Discuss the representation of polynomials of a single variable using a linked list. CO2  6-Answer any one of the following:-  6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  6-b. Use the merge sort algorithm to sort the following elements in ascending order. CO3  12,3,5,7,2,1,8,9,6			1	4. Answer any one of the following:-			
(b) AVL tree (c) Threaded binary tree (d) Complete tree  1-i. A graph with all vertices having equal degree is known as a CO5		(a) Binary search tree		4-a.	Explain non-linear data structure in detail with example, CO1	10	
(d) Complete tree  A graph with all vertices having equal degree is known as a CO5 1  (a) Mutli Graph (b) Regular Graph (c) Simple Graph (d) Complete Graph  1-j. A vertex with degree one in a graph in called CO5 1  (a) A leaf (b) Adjacency list (c) Pendent vertex (d) None of these  5. Answer any one of the following:  5-a. Explain the advantages and disadvantages of Single Circular linked List. Write the python function to insert a number in the beginning of single circular link list. CO2  5-b. Discuss the representation of polynomials of a single variable using a linked list. Write 'Python' functions to add two such polynomials represented by a linked list. CO2  6. Answer any one of the following:  6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  6-b. Use the merge sort algorithm to sort the following elements in ascending order. CO3  12,3,5,7,2,1,8,9,6				4-b.	Write program in python to multiply two matrices. Order of matrices must be	10	
1-i. A graph with all vertices having equal degree is known as a							
(a) Mutli Graph  (b) Regular Graph  (c) Simple Graph  (d) Complete Graph  (a) A leaf  (b) Adjacency list  (c) Pendent vertex  (d) None of these  (e) Pendent vertex  (f) Regular Graph  (g) Regular Graph  (h) Regular Graph  (g) Regular Graph  (h) Discuss the representation of polynomials of a single variable using a linked list. Write 'Python' functions to add two such polynomials represented by a linked list. CO2  (h) Discuss the representation of polynomials of a single variable using a linked list. Write 'Python' functions to add two such polynomials represented by a linked list. CO2  (h) A leaf  (h) Adjacency list  (c) Pendent vertex  (d) None of these  (e) Pendent vertex  (f) Pendent vertex  (g) None of these	1-i.		1			1 (	
(b) Regular Graph (c) Simple Graph (d) Complete Graph  1-j. A vertex with degree one in a graph in called CO5 (a) A leaf (b) Adjacency list (c) Pendent vertex (d) None of these  5-b. Discuss the representation of polynomials of a single variable using a linked list. Write 'Python' functions to add two such polynomials represented by a linked list. CO2  6. Answer any one of the following:-  6. Answer any one of the following:-  6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  6-b. Use the merge sort algorithm to sort the following elements in ascending order. CO3  12,3,5,7,2,1,8,9,6			1		python function to insert a number in the beginning of single circular link list. C02	11	
Write 'Python' functions to add two such polynomials represented by a linked list.  CO2  (d) Complete Graph  1-j. A vertex with degree one in a graph in called CO5  (a) A leaf  (b) Adjacency list  (c) Pendent vertex  (d) None of these  Write 'Python' functions to add two such polynomials represented by a linked list.  CO2  6. Answer any one of the following:-  6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  6-b. Use the merge sort algorithm to sort the following elements in ascending order.  CO3  10  CO3  11  12  13  14  15  16  17  18  19  19  19  19  10  10  10  11  10  11  11				5-b.		10	
(d) Complete Graph  1-j. A vertex with degree one in a graph in called CO5  (a) A leaf  (b) Adjacency list  (c) Pendent vertex  (d) None of these  (d) Complete Graph  6. Answer any one of the following:-  6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  6-b. Use the merge sort algorithm to sort the following elements in ascending order. CO3  CO3  12,3,5,7,2,1,8,9,6		(c) Simple Graph			Write 'Python' functions to add two such polynomials represented by a linked li CO2	ist.	
1-j. A vertex with degree one in a graph in called CO5  (a) A leaf  (b) Adjacency list (c) Pendent vertex (d) None of these  6. Answer any one of the following:  6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  6-b. Use the merge sort algorithm to sort the following elements in ascending order. 10  CO3  12.3,5,7,2,1,8,9,6							
(a) A leaf (b) Adjacency list (c) Pendent vertex (d) None of these  6-a. Write a program which performs insertion and deletion as per user choice in a queue. CO3  6-b. Use the merge sort algorithm to sort the following elements in ascending order. 10  CO3  12,3,5,7,2,1,8,9,6	1-i.		1	6. Ans	wer any one of the following:-		
(b) Adjacency list (c) Pendent vertex (d) None of these  Geb.  (d) Adjacency list  (e) Pendent vertex  (f) Use the merge sort algorithm to sort the following elements in ascending order.  (e) CO3  (f) CO3  (f) 1(2,3,5,7,2,1,8,9,6)	- 3-		1	6-a.		10	
(c) Pendent vertex (d) None of these  Ose the merge sort algorithm to sort the following elements in ascending order. 10  10  11  12  13  15  16  17  18  19  19  10  10  10  10  10  10  10  10							
(d) None of these 12,3,5,7,2,1,8,9,6	ì			6-b.	Use the merge sort algorithm to sort the following elements in ascending order.	10	
	2. Att	empt all parts:-		7. Ansv			



Page 4 of 4