Code No: R161213 **R16** SET - 1

I B. Tech II Semester Regular/Supplementary Examinations, April/May- 2019
DATA STRUCTURES
(Com. to ECE, EIE, E Com E)

Time: 3 hours Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1.	a)	What are the features of sparse matrix?	(2M)
	b)	Convert the following expression into postfix A-B*C+D-E+F/G-H.	(2M)
	c)	What is an equivalence class?	(2M)
	d)	What are the features of a threaded binary tree?	(2M)
	e)	Define transitive closure.	(2M)
	f)	Give the best case, average case, worst case time complexity of recursive merge sort.	(2M)
	g)	What are the limitations of doubly linked lists?	(2M)

PART –B

2.	a)	Discuss about sparse matrix multiplication with example. Also write a function for its implementation.	(7M)
	b)	Explain the representation of polynomial using Abstract Data Type.	(7M)
3.	a)	Discuss infix to prefix conversion algorithm using stack with an example.	(7M)
	b)	Explain the procedure to evaluate postfix expression **6 2 3 + - 3 8 2 / + * 2 4 3 +**.	(7M)
4.	a)	Discuss about implementation of queues using linked list.	(7M)
	b)	Write an algorithm to insert new node at the beginning, at middle position and at the end of a Singly Linked List.	(7M)
5.	a)	A binary tree has seven nodes. The Preorder and Postorder traversal of the tree are given below. Can you draw the tree? Justify. Preorder : GFDABEC Postorder : ABDCEFG	(7M)
	b)	Create binary search tree for the following elements (23, 12, 45, 36, 5, 15, 39, 2, 19). Discuss about the height of the above binary search tree.	(7M)
6.	a)	Explain about the Prim's algorithm with example.	(7M)
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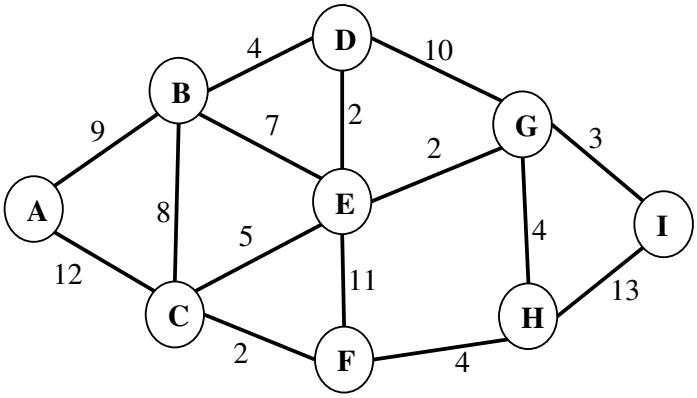
b) Explain Sollin's algorithm and find the number of minimum spanning tree on the below graph. (7M)



7. a) Explain the quick sort algorithm with an example. (7M)

b) Arrange the following list of elements in ascending order using heap sort: 9, 3, 5, 27, 4, 67, 18, 31, 13, 20, 39, 21. Clearly show the sorting process at each step. (7M)

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PART –A

1.	a)	What is an abstract data type?	(2M)
	b)	Write the rules followed in evaluation of expression in postfix notation.	(2M)
	c)	Write the advantages and disadvantages of linked lists.	(2M)
	d)	Can any binary tree have postorder and preorder traversal the same? If yes, give an example.	(2M)
	e)	Differentiate between DFS and BFS.	(2M)
	f)	Give the best case, average case, worst case time complexity of heap sort.	(2M)
	g)	Give the applications of minimum cost spanning trees.	(2M)

PART –B

2.	a)	Describe the array and linked list representation of sparse matrix.	(7M)
	b)	Write ADT operations for array implementation of polynomial addition.	(7M)
3.	a)	Explain the queue ADT with an example.	(7M)
	b)	Write an algorithm for evaluating a postfix expression using stack. Evaluate the following postfix notation 123*+5-.	(7M)
4.	a)	What are generalized lists? How are they different from Singly and Doubly linked lists?	(7M)
	b)	With a suitable example, explain how polynomials are added using linked lists.	(7M)
5.	a)	Create max heap for the following elements 33, 14, 65, 02, 76, 69, 59, 85, 47, 99, 98.	(7M)
	b)	What is a binary search tree? Write an algorithm for inserting and deleting a node in a binary search tree.	(7M)
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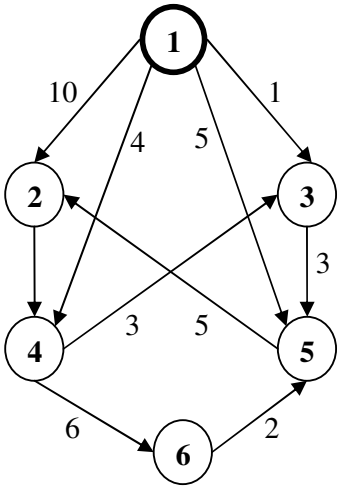
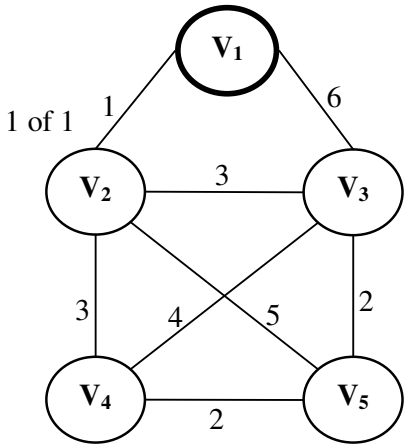
6. a) Show how the Dijkstra's algorithm works on each of the graphs. The source vertices are denoted by think circle. (7M)





b) What is minimum cost spanning tree? Discuss with an example. (7M)

7. a) Describe insertion sort algorithm and trace the steps of insertion sort for sorting the list- 12, 19, 33, 26, 29, 35, 22, 37. Find the total number of comparisons made. (7M)

b) Explain the iterative merge sort and recursive merge sort algorithms with an example. (7M)

Code No: R161213 **R16** SET - 3

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3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1.	a)	What are the two part of ADT? Explain.	(2M)
	b)	Convert ((A+B) * C – (D – E)) / (F + G) To Postfix and Prefix notation.	(2M)
	c)	What are the disadvantages of representing a stack or queue by linked list?	(2M)
	d)	Write the steps in in-order, pre-order and post order traversals.	(2M)
	e)	Define All –Pair's shortest path problem in graphs.	(2M)
	f)	What are the limitations of insertion sort?	(2M)
	g)	Define level and depth of a binary tree.	(2M)

PART –B

2.	a)	Explain transposing of a matrix with an example. Also write a function for its implementation.	(7M)
	b)	How to implement polynomial ADT using array? Illustrate.	(7M)
3.	a)	Convert the given infix Expression ((A+B)*C-(D-E)^(F+G)) into its Equivalent Prefix and Postfix Notations.	(7M)
	b)	Write an algorithm for converting infix expression to prefix expression.	(7M)
4.	a)	Explain the representation of sparse matrix using linked list.	(7M)
	b)	Describe how a node can be deleted at a user specified position in a doubly linked list.	(7M)
5.	a)	Explain the process of finding the minimum and maximum elements of the binary search tree.	(7M)
	b)	What is priority queue? Give the implementation of priority queue using heaps.	(7M)
6.	a)	Explain about Depth First Search with suitable examples.	(7M)
	b)	Write an algorithm for minimum cost spanning tree using Kruskal's algorithm.	(7M)
7.	a)	Arrange the following list of elements in ascending order using Merge Sort A, L, G, O, R, I, T, H, M, S Clearly show the sorting process at each step.	(7M)
	b)	How to select pivot element in quick sort? Explain how partition is done in quick sort with example.	(7 M)
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2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1.	a)	What are the properties of Abstract Data Type?	(2M)
	b)	Why infix expression should be converted to Prefix / Postfix?	(2M)
	c)	What is a recursive list and give its properties.	(2M)
	d)	What is a binary search tree?	(2M)
	e)	Define connected and bi-connected components.	(2M)
	f)	What is the difference between internal and external sorting techniques?	(2M)
	g)	What is meant by height of a binary search tree?	(2M)

PART -B

2.	a)	Why sparse matrix representation of data is sometimes more efficient than simple matrix. Illustrate.	(7M)
	b)	Explain polynomial manipulation using linked list with an example.	(7M)
3.	a)	Convert the given infix expression A+B^C+(D*E/F)*G into its postfix expression, and evaluate the same using stack. Here A=3, B=5, C=2, D=7, E=4, F=1, G=8.	(7M)
	b)	Define stack ADT. Explain basic operations of a stack ADT.	(7M)
4.	a)	Compare singly and circular linked list while performing insertion and deletion operations.	(7M)
	b)	Explain the procedure to insert and delete element from sparse matrix. Using lists.	(7M)
5.	a)	Explain the process of displaying the nodes of a binary tree at a particular level.	(7M)
	b)	Sketch the binary search tree resulting after inserting the following integer keys 49, 27, 12, 11, 33, 77, 26, 56, 23, 6. i) Check whether the tree is almost complete or not? ii) Determine the height of the tree iii) Write post order and preorder traversals.	(7M)
6.	a)	Explain about Breadth First Search with an example.	(7M)
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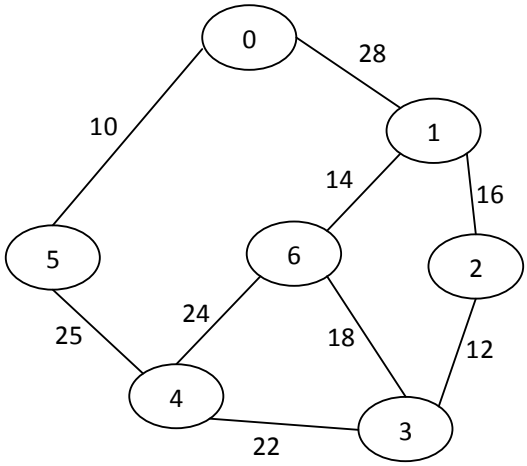
b) Explain Sollin's algorithms to find MST for the following graph. (7M)



7. a) Explain any external sorting method with suitable example. (7M)

b) Sort the elements using Merge Sort: 52, 38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72. (7M)