Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

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A Constituent Institution of Manipal University

VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) END SEMESTER EXAMINATIONS, APRIL - MAY 2017

DATA STRUCTURES & ALGORITHM [ELE 4018]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 29 April 2017** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. A square matrix is called symmetric if for all values of **i** and **j**, $a[i][j] = a[j][i]$. Write an algorithm, with detailed comments, which verifies whether a given 5 x 5 matrix is symmetric. ***(03)***

1B. Let there be a single linked list whose address of the first node is stored in LIST. Write an algorithm, with detailed comments, which has 2 subroutines to perform the following operations:

a) One finds the number of times (say, NUM) a given item (say, ITEM) occurs in LIST.

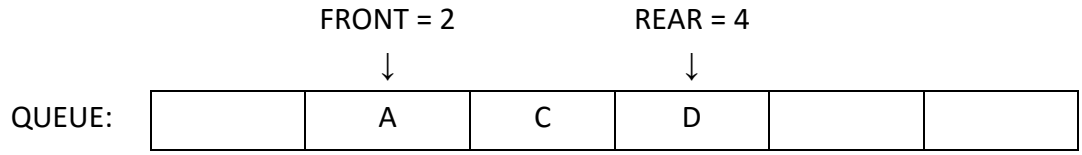
b) Other finds the number of nonzero elements (say, NONZERO) in LIST. ***(04)***

1C. Write a procedure, with detailed comments, to delete a node from a double linked list if the key (say, KEY) is found. ***(03)***

2A. Represent the arithmetic expression $P = ((A + ((B\hat{}C) - D)) * (E - (A/C)))$ in prefix and postfix notations. ***(02)***

2B. A function, InfixToPostfix(), converts the infix expression given above in Q. 2A into postfix notation using a stack. The function performs push and pop operations on the stack by calling PUSH() & POP() subroutines respectively. Write the procedure for InfixToPostfix(). Also write separate algorithms for PUSH() and POP() subroutines. The stack is implemented using an array. ***(06)***

2C. Consider the following queue of characters, where QUEUE is a circular array which is allocated 6 memory cells:



What will be FRONT and REAR values & QUEUE elements after each of the following operations?

a) F is added to the queue

b) 2 letters are deleted

c) K, L & M are added to the queue

d) 2 letters are deleted ***(02)***

3A. The inorder and preorder traversals of a binary tree are shown in the table below. Construct the binary tree.

Inorder	D	B	H	E	A	I	F	J	C	G
Preorder	A	B	D	E	H	C	F	I	J	G

(02)

3B. Write an algorithm with detailed comments to insert an element in a given max heap tree. Assume that the heap is implemented using array. ***(04)***

3C. Explain the breadth first search (BFS) traversal for the graph shown in Fig. 3C below. ***(04)***

4A. Write an algorithm to sort an array of integers using radix sort. ***(05)***

4B. Write an algorithm to implement binary search for an array of "**n**" elements. ***(05)***

5A. Consider the weighted graph shown in Fig. 5A. Write the steps for finding minimum spanning tree using Kruskal's algorithm. ***(06)***

5B. Explain the divide and conquer approach in quick sort. ***(04)***

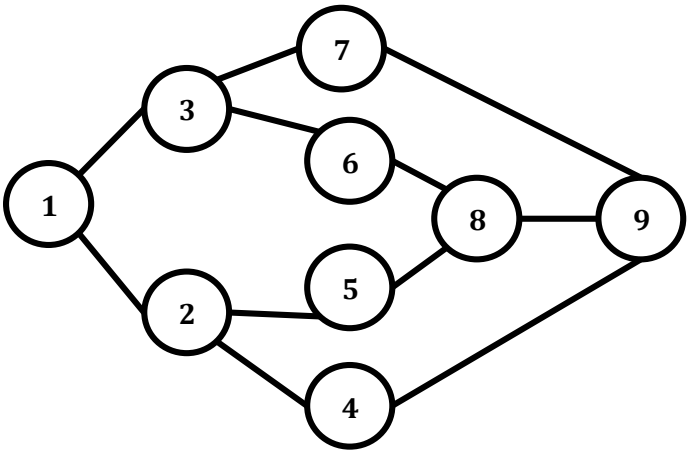


Fig. 3C

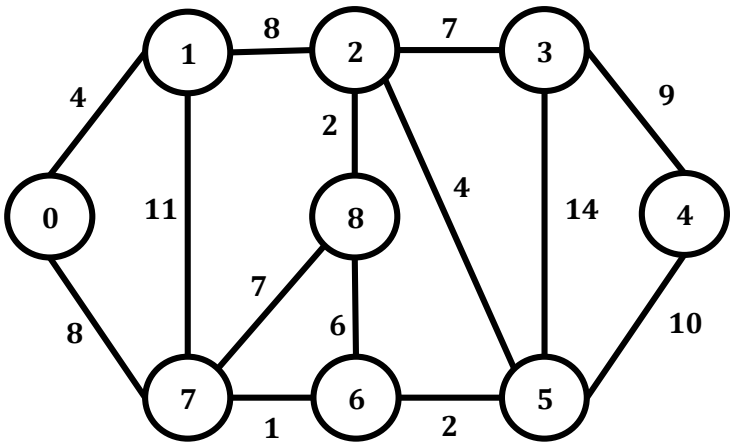


Fig. 5A