

Question Paper

Exam Date & Time: 09-Oct-2020 (02:00 PM - 05:30 PM)



BMS COLLEGE OF ENGINEERING

Autonomous Institute Affiliated to VTU, Supplementary Semester End Main Examinations, October 2020

Data Structures [19CS3PCDST]

Marks: 100

Duration: 210 mins.

Computer Science Engineering, Sem-III

Answer all the questions.

Instructions:

1. Answer FIVE full questions using the given internal choice
2. Missing data, if any, may be suitably assumed

- 1) Convert the following infix expression to postfix expression: (7)
a) $((A + B) - C * (D / E)) + F$
b) Write a program to implement queue (First-In First-out operations) using two stacks. (8)
c) Show the recursive function calls for computing the factorial(n) for n=5. Draw the recursion tree. (5)
- 2) (5)
a)

Consider the code given below:

```
void fun(Queue *Q)
{
    Stack S; // Say it creates an empty stack S

    // Run while Q is not empty
    while (!isEmpty(Q))
    {
        // deQueue an item from Q and push the dequeued item to S
        push(&S, deQueue(Q));
    }
}
```

```

// Run while Stack S is not empty
while (!isEmpty(&S))
{
    // Pop an item from S and enqueue the popped item to Q
    enqueue(Q, pop(&S));
}
}

```

What does the above function do in general? Explain.

b) What are the differences between linear queue and circular queue? (5)

c) B.M.S. College of Engineering is planning to conduct a value added course on “Advanced Data Structures”. The number of participants is restricted to 25. Participants are selected based on first come first serve basis. Also, if one of the participant wishes to not attend then the next one in the list can attend the same. Also, “Seats full!” message needs to be displayed when all 25 people have registered. Implement the following scenario using a suitable data structure. (10)

3) (10)

a)

Write a function to get the intersection point of two Linked Lists.

There are two singly linked lists in a system. By some programming error, the end node of one of the linked list got linked to the second list, forming an inverted Y shaped list. Write a program to get the point where two linked list merge.

b) Given only a pointer to a node to be deleted in a singly linked list, how do you delete it? (10)

[OR] 4) Write a function that moves the last element to the front in a given Singly Linked List. For example, if the given Linked List is 1->2->3->4->5, then the function should change the list to 5->1->2->3->4. (7)

a) function should change the list to 5->1->2->3->4. (8)

b) Given a singly linked list, write a function to swap elements pairwise.

Input : 1->2->3->4->5->6->NULL

Output : 2->1->4->3->6->5->NULL

Input : 1->2->3->4->5->NULL

Output : 2->1->4->3->5->NULL

c) (5)

Consider the code given below:

```
void fun2(struct Node* head)
{
    if(head== NULL)
        return;
    printf("%d ", head->data);

    if(head->next != NULL )
        fun2(head->next->next);
    printf("%d ", head->data);
}
```

What does the function do?

Also, write the output for the following two input values:

(a) 1->2->3->4->5

(b) 1->2->3->4->5->6

- 5) Given the following set of numbers: 40, 25, 28, 39, 76, 87, 12, 34, 67, 11. Insert (6)
- a) the following values into a hash table. Choose appropriately the size of the hash table. Also, show how collision is resolved using linear probing.
- b) Write a program to delete all occurrences of a given key in a doubly linked list. (8)
- c) Write a program to reverse the contents of a doubly linked list. (6)

- [OR]
6) Given a singly circular linked list of N nodes. The task is to find the smallest (10)
- a) and largest elements in the circular linked list.

Examples:

Input : List = 99->11->22->33->44->55->66

Output : Minimum = 11, Maximum = 99

Input : List = 12->11->9->33->125->6->99

Output : Minimum = 6, Maximum = 125

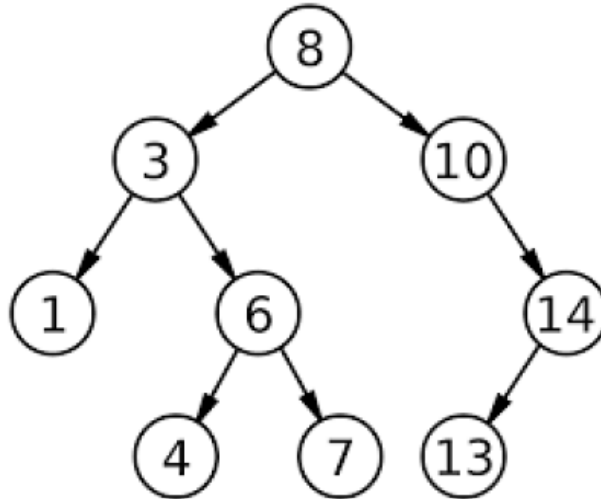
- b) Given a circular singly linked list containing N nodes. The task is to delete all (10)

nodes from the list which are prime.

7) Write a program to find the minimum value in a Binary Search Tree. (8)

a) For the below Binary Search tree, perform the following: (6)

- (i) Inorder traversal
- (ii) Preorder traversal
- (iii) Postorder traversal



c) Write a program to remove all the leaf nodes from a Binary Search Tree. (6)

-----End-----