B.E./B.TECH. Degree Examination, December 2020

Third Semester

CS16351-PROGRAMMING AND DATA STRUCTURES

(Regulation 2016)

Time: Three hours Maximum : 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1.
```
#include <stdio.h>
int main()
{
  int a = 300, b, c ;
  if ( a >= 400 )
  b = 300 ;
  c = 200 ;
  printf ( "\n%d %d", b, c ) ;
  return 0;
}
```
What is the output of the above code?

a) Garbage value, 200
b) 0,0
c) Program doesn't compile
d) 300, 300

2. What does the following function do for a given Linked List with first node as *first*?
```
void myfun(struct node* first)
{
 if(first == NULL)
   return;
 myfun(first->next);
 printf("%d  ", first->data);
}
```
a) Prints all nodes of linked lists
b) Prints all nodes of linked list in reverse order
c) Prints alternate nodes of Linked List
d) Prints alternate nodes in reverse order

3. The result evaluating the postfix expression 5 2 + 10 2 / * 2 – is ----------

4. Consider a binary tree T that has 100 leaf nodes. Then, the number of nodes in T that have exactly two children are
   a) 105
   b) 99
   c) 101
   d) 100
5. Write a program to generate all combinations of 1, 2 using for loop.
6. Write a function to search an element 'k' in a singly linked list
7. The following sequence of operations is performed on queue: Enq(5), Enq(20), Deq, Enq(5), Enq(20), Deq, Deq, Deq, Enq(20), Deq. What is the sequence of the value dequeued?
8. Why the time complexity of binary search is ($\log_2 n$)? Justify your answer.

PART B - (4 X16 = 64 marks)

09. (a) Write a program to copy one file to another. While doing so replace all lowercase characters to their equivalent uppercase characters. **(16)**

(OR)

(b) Write a program to create a file called 'test.txt'. Write a program to encrypt the same file and read the contents of encrypted file. **(16)**

10. (a) Write a program to merge two sorted linked list. **(16)**

Sample Input:

List1 : 1->2->4

List2 : 2-> 3-> 10

Expected Output: 1->2->2->3->4->10

(OR)

(b) Create a singly linked list and write a function to **(16)**
   (a) Insert an element at the end of the list.(6 marks)
   (b) Traverse the list (4 marks)
   (c) Check if the list is a palindrome (6 marks)

Sample Input1: 1->2

Expected Output: False

Sample Input2: 1->2->1

Expected Output: True

11. (a) Assume the initial binary search tree is empty. Insert the following keys in the order: 50,35,90,54,73,12,44,23,67,200. Delete the keys 50, and 35. Show the resultant tree. (4 marks) **(16)**

Write the pseudocodes for the following functions:

(a) Insert an element in a binary search tree (4 marks)

(b) Consider 'myOrder' strategy for traversing the binary search tree: (1) Visit the root (2). Visit the right subtree using 'myOrder' (3). Visit the left subtree using 'myOrder'. What is the 'myOrder' traversal for the above resultant binary search tree? (4 marks)

(c) Delete an element from the binary search tree. (4 marks)

(OR)

(b) Interpret the vertices in G as cities and the undirected edges as the cost to lay down fiber optic cable. Calculate the cost from 'a' to each city. Let V={a,b,c,d,e,f,g} E={(a,b):9, (a,g):5, (a,f):8, (b,g):3, (b,c):2, (c,g):4, (c,d):7 (d,g):1, (d,e):2,(e,f):5, (e,g):6, (f,g):7}. **(16)**

12. (a) Analyse the quick sort algorithm and show the result of sorting in each iteration of quick sort for the following numbers: 15,135,190,55,74,121,447,24,76,150. **(16)**

(OR)

(b) Analyse the merge sort algorithm and show the result of sorting in each iteration of merge sort for the following numbers: 15,135,190,55,74,121,447,24,76,150. **(16)**