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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 19ET5PE1DS **Max Marks: 100**
Course: C++ AND DATA STRUCTURES **Date: 20.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably assumed.

UNIT - I

1 a) List the features of object oriented programming and describe them in brief. **06**

b) Create two classes called ONE and TWO respectively. Each class should have one data member. Include a friend function called SWAP ( ) and define it outside the class body. SWAP should swap the data members of two classes defined earlier. Create suitable objects in the main program and display the members before and after swap. **08**

c) Write the output for following c++ codes. **06**

(i) Write the output

```
#include<iostream>
using namespace std;

void value(int &x)
{
x=++ x-3;
}
 main ( )
{
int k=5;
value(k);
cout<<k<<endl;
}
```

(ii) Write the output

```
#include<iostream>
using namespace std;
main()
{
int x=8,y=3;
x=--x + y++;
y=x-- + y++ ;
cout<<x;
cout<<y;
}
```

(iii) Write the output

```
#include<iostream>
using namespace std;
int x=100;
main()
{
int x=300;
::x=400;
cout<<::x<<endl;
}
```

UNIT - II

2 a) Complete the program for the main ( ) given below. **07**

```
main ( )
{
   Count count1; // Count is a class and count1 is an object.
   count1++;
   count1.display();
   ++count1;
   count1.display();
}
```

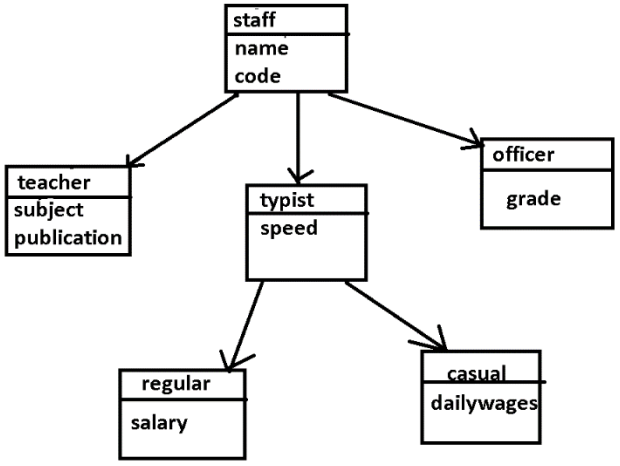
b) Write a c++ program using manipulators to display the output as shown below. You are suppose to type manipulator functions only once in the program. **05**

3.1
3.14
3.143
3.1429
3.14286

c) Write a c++ program to add 2 complex numbers. Create class complex. Make use of the constructors with no argument, 1 argument and 2 arguments. Write a friend function to sum and display. **08**

UNIT - III

3 a) An educational institution wishes to maintain a database of its employees. The database is divided into a number of classes whose hierarchical relationships are shown in figure. The figure also shows the minimum information required for each class. Specify all the classes and define functions to create the database and retrieve individual information as and when required. **10**



b) Describe class template using a suitable c++ program **05**

c) What is exception handling? Explain with the help of a suitable c++ program **05**

UNIT - IV

4 a) Write a c++ program to implement stack using linked list. The program should include push, pop and display operations **10**

b) Write a c++ program to implement queue using an array. The program should include insert, remove and display functions **10**

OR

5 a) Write a c++ program to implement stack using an array. The program should include push, pop and display operations. **10**

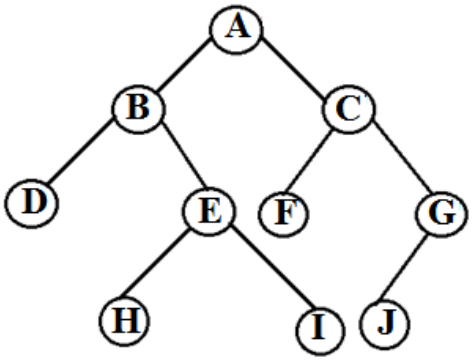
b) Write a c++ program to implement queue using a linked list. The program should include insert, remove and display functions **10**

UNIT - V

6 a) What is skip list? Explain with the help of an example **06**

b) Write a c++ program to implement a hash table. **10**

c) For the binary tree given, answer the following questions **04**



(i) Write the internal nodes
(ii) Write the external nodes
(ii) What is the height of tree?
(iv) What is the depth of node F?

OR

7 a) Write a c++ program to implement traversal mechanisms in a binary tree. **10**

b) What is a hash function? Explain with the help of an example. **05**

c) Discuss the heap sort algorithm using an example. **05**

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