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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Computer Science and Engineering

Semester End Examination; Dec - 2017 / Jan - 2018

Object Oriented Programming with C++

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Explain encapsulation, polymorphism and inheritance in OOPs with suitable examples for each. 6

b. Write the output of the following code : 4

```
# include <iostream.h>
void figure_out(int&, int, int&);
void figure_out (int &x, int y, int &z)
{
x = 1; y =  2; z = 3
cout <<x<<y<<z;
}
int main ( )
{
int a = 10, b = 20, c = 30;
figure _out(a,b,c);
cout <<a<<b<<c;
}
```

c. Write a C++ program to create a class called 'student' with name, class, roll number, mark and result as data members. The class must contain member functions to, 10

i) read_name, class, roll number and marks of 3 subjects

ii) Compute result (Average of 3 subject marks) iii) print all details of student

Use this class to read and print details of 10 students.

2 a. Compare structures in C and C++. 6

b. What is a static member function and what is the need of it? Demonstrate its use with an example program. 10

c. Describe the mechanism of accessing data members and member functions in the following cases : 4

i) Inside the main program ii) Inside a member function of the same class.

UNIT - II

3 a. What is dynamic constructor? Write its advantages. Demonstrate the same for string with an example code. 6

b. Suppose a program contains the following definition : 6

```
class my_class
{
public:
my_class (int a, char c) {inf=a; more_info = C;}
my_class ( ) { }
void do_stuff ( );
```

Contd... 2

```
private:
int inf;
char more_info;
}
int main( )
{
 my_class a_object;
}
```

Which of the following are legal?

i) my_class a_object (42, 'a'); ii) my_class another_obj;
iii) my_class another_ob( ); iv) a_object=my_class (99, 'b');
v) a_object = my_class( ); vi) a_object = my_class;

c. Describe the importance of Constructor and Destructor. 4

d. Distinguish between the following statements:
timeT2(T1) and time T2=T1; 4
Where T1 and T2 are objects of 'time' class.

4 a. The class 'time' contains hours, minute and second. Write a C++ program to perform addition and subtraction of given 2 objects of class 'time' using operator overloading. 10

b. What is the difference between overloading a binary operator and a function call? Is it possible using operator overloading to change the behavior of '+' on integers? Justify your answer. 4

c. Write member functions to overload unary operation (Post and Pre-increment operator). 6

UNIT - III

5 a. Write a class template to represent a vector. Include member functions to perform the following tasks:
i) To create a vector ii) To modify the value of a given element
iii) To multiply by a scalar value iv) To find maximum element in vector
v) To display the vector
Also write main function 12

b. Distinguish between overload functions and function template. 4

c. What is generic programming. How is it implemented in C++? 4

6 a. What is exception? Give few examples. Write a program to demonstrate "try", "catch" and "throw" keywords for implementing exception handling. 10

b. Write a program to demonstrate the concept of rethrowing an exception and how certain exceptions are not allowed. 10

UNIT - IV

7 a. Explain multiple and multi-level inheritance with suitable examples 6

b. What are ambiguities arise when functions from multiple base classes are inherited? How can they be resolved? Explain with an example program. 10

c. Explain virtual base class 4

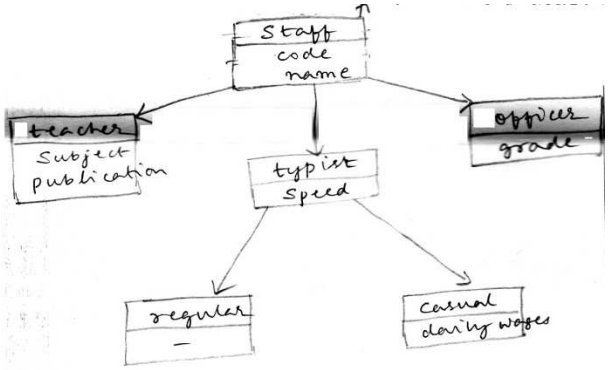
8 a. Find errors in the below program. State reasons and specify the statements which generate errors. 7

```
class X
{
private: int x1;
protected: int  x 2;
public :int x3;
}
```

Contd.... 3

```
class Y: public X
{
void f( )
{
int y1, y2, y3;
y1 = x1;
y2 = x2
y3 = x3
}
};
class Z : X
{
public:
void f( )
{
int z1 z21 z3;
z1 = x1;
z2 = x2
z3 = x3
}
};
main ( )
{
int m,n,p;
Y y;
m = y.x1;
n = y.x2;
p = y.x3;
Z  z ;
m = z.x1;
n =z.x2;
p =z.x3;
}
```

b. An educational institute wishes to maintain database of its employees. The data base is divided into a number of classes whose hierarchical relationship is shown below. The figure also shows information required for each class. Write the declaration of all classes with its data members. Write member functions read and display details for staff and teacher class. Demonstrate the working by reading and displaying details of teacher object. 10



Contd... 4

c. What is the role of protected visibility specifier in a class? 3

UNIT - V

9 a. What does, 'this' pointer point to? What are the applications of 'this' pointer with an example. 6

b. Compare compile time polymorplhism and run time polymorphism. 4

c. Create a base class called 'shape'. Use this class to store 2 double type values that could be used to compute the area of figures. Derive 2 specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data ( ) to initialize base class data members and another member function display_ area ( ) to compute and display the area of figures. Make display _area ( ) as a virtual function and redefine this function in the derived classes to suit their requirements. Using these 3 classes, design a program that will accept dimensions of a trianble or rectangle and display the area. 10

The 2 values given as input will be treated as lengths of 2 sides in the case of rectangle and as base and height in case of triangle.

10 a. How do I/O facilities in C++ differ from that in C? 5

b. Discuss five member functions of ios class used to format the output. 10

c. What will be the output of the following program segments? 5

i)

```
for(i = 0.25; i <= 1.0; i = i+0.25)
{
cout.precision (5)
cout.width (7);
cout<<i;
cout.width (10);
cout <<i*i<< "\n";
}
cout<<setw(10)<< "total="
     <<setw(20)<<setprecision (2) << 1234.567
    <<endl;
```

ii)

```
float pi= 22.0/7.0; //pi=3.1428570747
int I;
cout << "value of pi:\n";
for (i=1; i<=10; i++)
{
cout.width (i+1);
cout.precision (i);
cout<<pi<<endl;
}
```

* * *