

Consider the following declarations and answer the question given below:

```
class Vehicle
{
private:
int wheels;
protected :
int passenger:
public :
void inputdata(int, int);
void outputdata();
};
class Heavyvehicle : protected Vehicle
{
int diesel_petrol;
protected :
int load;
public:
void readdata(int, int);
void writedata();
};
class Bus : private Heavyvehicle
{
char make[20];
public :
void fetchdata(char);
void displaydata();
};
```

- (i) Name the base class and derived class of the class **Heavyvehicle**.
- (ii) Name the data member(s) that can be accessed from function **displaydata()**.

- (iii) Name the data member's that can be accessed by an object of **Bus** class.
- (iv) Is the member function **outputdata()** accessible to the objects of **Heavyvehicle** class.

## Question # 02:

### Wheels and Cars

A Car is composed of four Wheel thingies. If a car is moving, all its wheels are moving (if nothing else has gone wrong).

#### 2.1 Wheels for Cars

Let's first do wheels!

1. You need to define a Wheel class. At the moment, this class should have just a single variable state of type

string. Make sure this variable is *hidden* from those outside the class!

2. Now, within this class, define a public function with the following declaration:

void set\_wheel\_state(string s); This function should take set the state of the wheel to the value passed in as s.

3. Write another function in this class with the following declaration:

string get\_wheel\_state() This should simply return the state of the wheel.  
After this, you should be able to run Part - 3 of the main function in the starter file.

#### 2.2 Cars on Wheels

Once we have a Wheel class, we can use it within our Car class.

1. Define a new class Car. This should have an *array of wheels* – the size of the array should be 4 since we have

only four wheels. Make sure this array is *not* visible from outside the class.

2. Next, write a function set\_car\_to\_moving within this class. This function should set the states of all four

wheels to "Turning". That's it!

3. Write another function `set_car_to_stopped` same as above except the state of all four wheels should be set

to "Stopped".

4. Finally, write a function `print_car_wheels_state` in this class which outputs the state of all four wheels

in the following  
format:

Car state: - Wheel 0 is  
Stopped - Wheel 1 is  
Stopped - Wheel 2 is  
Stopped - Wheel 3 is  
Stopped

Of course, if the car is moving, all output lines should have the word **Turning** there. Make sure you use the `get_wheel_state` function of the wheel you defined earlier for this. After this, you should be able to run Part - 4 of the main function in the starter file.

### Question # 03:

Write three derived classes inheriting functionality of base class **person** (should have a member function that ask to enter name and age) and with added unique features of **student**, and **employee**, and functionality to assign, change and delete records of student and employee.

And make one member function for printing address of the objects of classes (base and derived) using **this** pointer.

Create two objects of base class and derived classes each and print the addresses of individual objects.

Using calculator, calculate the address space occupied by each object and verify this with address spaces printed by the program.

### Question # 04:

Write base class that ask the user to enter a complex number and derived class adds the complex number of its own with the base.

Finally make third class that is **friend** of derived and calculate the difference of base complex number and its own complex number.

***Make a Zip File that contains the source codes for the above programs and a word file that contains a detailed report of the given assignment, source codes and screenshots of the console window. The name of the zip file should be Name-Roll of each student.***

