CONFIDENTIAL

SCHOOL OF COMPUTING
Faculty of Engineering

UNIVERSITI TEKNOLOGI MALAYSIA

FINAL EXAM – PART 2

SEMESTER II 2019/2020

SUBJECT CODE	**: SECJ/SCSJ 1023**
SUBJECT NAME	**: PROGRAMMING TECHNIQUE II**
YEAR/COURSE	**: 1 (SECB/SECJ /SECP/SECR/SECV)** **2 (SCSR/SCSV)**
TIME	**: 2.00 pm – 2.45 pm (45 minutes)**
DATE/ DAY	**: 9th JULY 2020 (THURSDAY)**

This examination book consists of **20 objective questions**. Choose the correct answer. Each question carries **1.5 marks**.

- *The questions will be chosen randomly based on topic:*
  - *Class Relationships*
  - *Inheritance*
  - *Polymorphism*
  - *Exception handlings*

OBJECTIVE QUESTIONS (30 Marks)

Class Relationships

LOT (3 of 6 Questions will be chosen randomly)

1. The following figure shows a relationship of

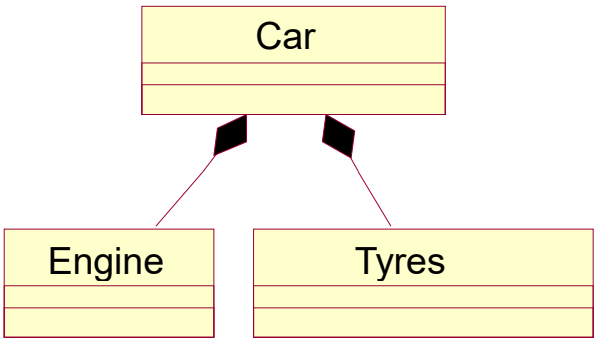
A `Aggregation`

B `Composition`

C `Association`

D `Polymorphism`

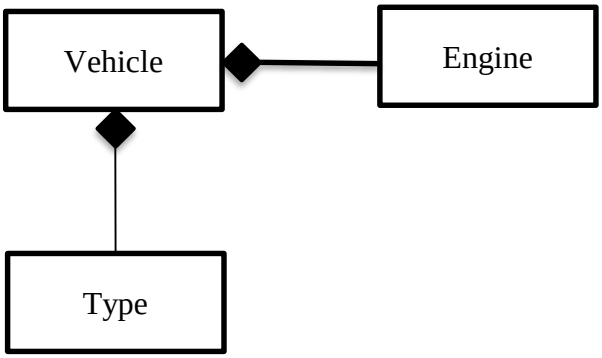
2. Based on the following figure, find the correct C++ code which shows the relationship.



A
```
class Car
{
 Engine engine;
 Tyres tyres;
};
```
B
```
class Tyres
{
 Car car;
 Engine engine;
};
```
C
```
class Engine
{
 Tyres ty;
 Car car;
};
```

D
```
class Car
{
 Tyres ty;
 Engine engine;
 Car car;
};
```

3. Which statement is CORRECT to describe the following UML Diagram?



A It represents has-a relationship

B The entities are highly independent towards each other

C The composed object can exists without the other entity

D It is a restricted form of aggregation

4. Which of the following relationships is unidirectional?

A Aggregation

B Association

C Composition

D Both Aggregation and Composition

5. Given the following fragment of code, identify the relationship between the classes that the class definition represents.

```
1  class Bike
2  {
3        Engine objEng;
4  };
5
6  class Engine
7  {
8        float cc;
9  };
```

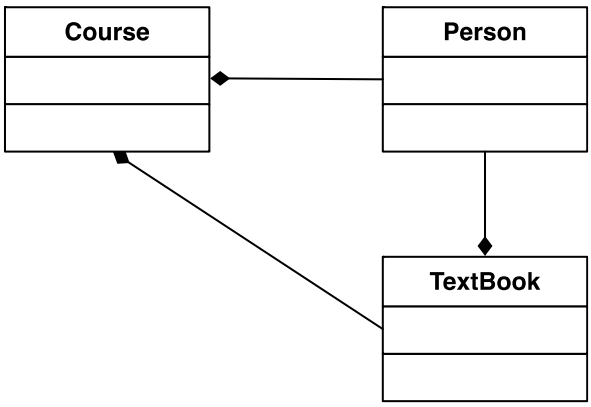
A Kind of relationship

B Has-A relationship

C Inheritance

D Is-A relationship

6. Given the following class diagram that represents the relationship between the class Person, TextBook and Course, fill in the blanks the following code segment.




```
1   class Person
2   {
3         private:
4                 string name;
5   };
6
7   class TextBook
8   {
9         private:
10                Person author;
11  };
12
13  class Course
14  {
15        private:
16                _______(i)_______
17                _______(ii)______
18  };
```

A i) TextBook book;

ii) Person instructor;

B i) TextBook book;

ii) Person author;

C i) TextBook book;

ii) string name;

D i) Course subject;

ii) Person author;

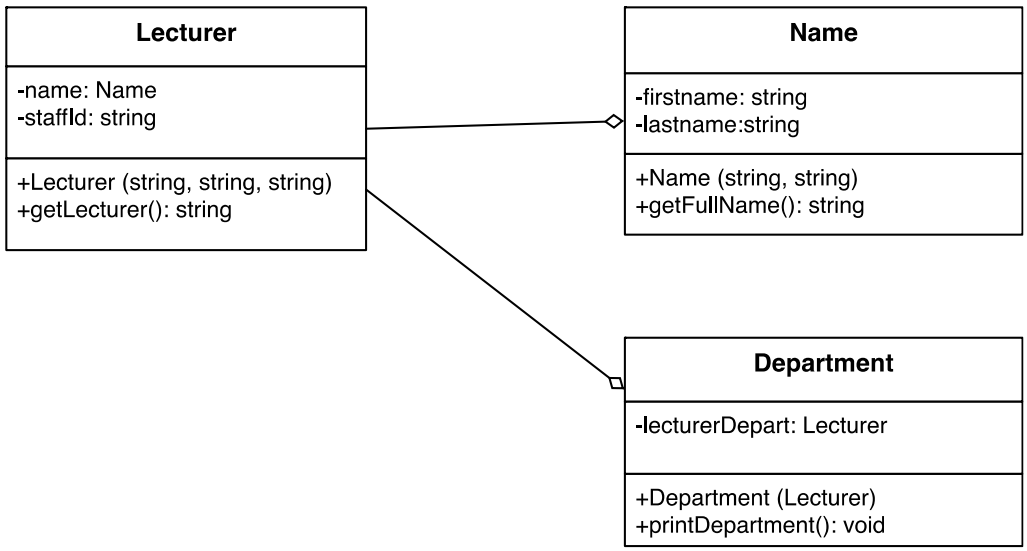
HOT (1 of 2 Questions will be chosen randomly)

1. Given the following fragment of code, identify which UML class diagram that represents the relationship between the classes.

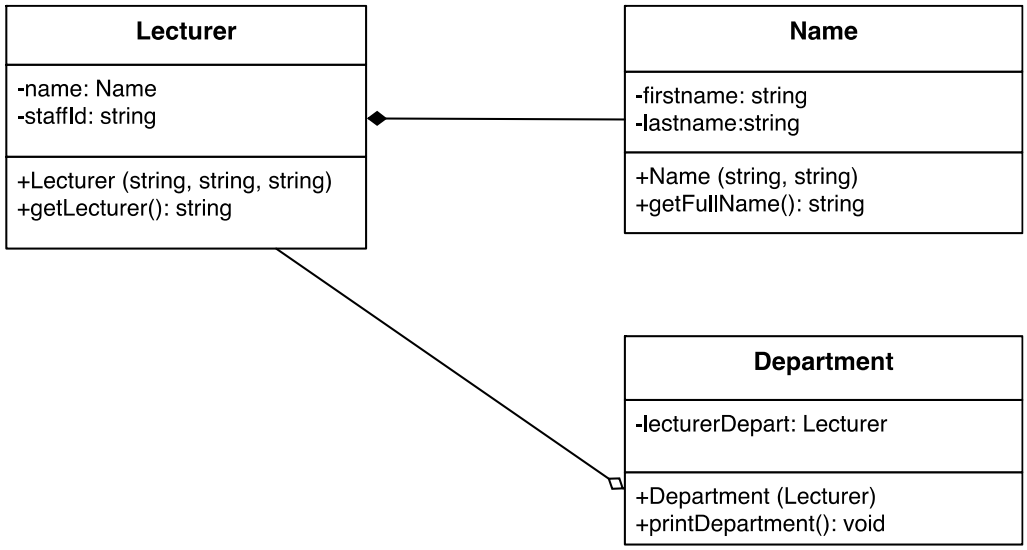
```
1  class Name
2  {
3    private:
4      string firstname, lastname;
5
6    public:
7      Name(string fname, string lname)
8      {
9        firstname = fname;
10       lastname = lname;
11     }
12
13     string getFullName()
14     {
15       return firstname + " " + lastname;
16     }
17 };
18
19 class Lecturer
20 {
21   private:
22     Name name;
23     string staffId;
24
25   public:
26     Lecturer(string fname, string lname, string sId):
27     name(fname, lname)
28     {
29       staffId = sId;
30     }
31
32     string getLecturer()
33     {
34       return name.getFullName() + "\nLecturer id  : "
35            + staffId;
36     }
37 };
38
39 class Department
40 {
41   private:
42     Lecturer *lecturerDepart;
```

```
43
44      public:
45        Department(Lecturer *lectDepart)
46        {
47          lecturerDepart = lectDepart;
48        }
49
50        void printDepartment()
51        {
52          cout << "Lecturer name: " <<
53               lecturerDepart->getLecturer() << endl;
54        }
55    };
```

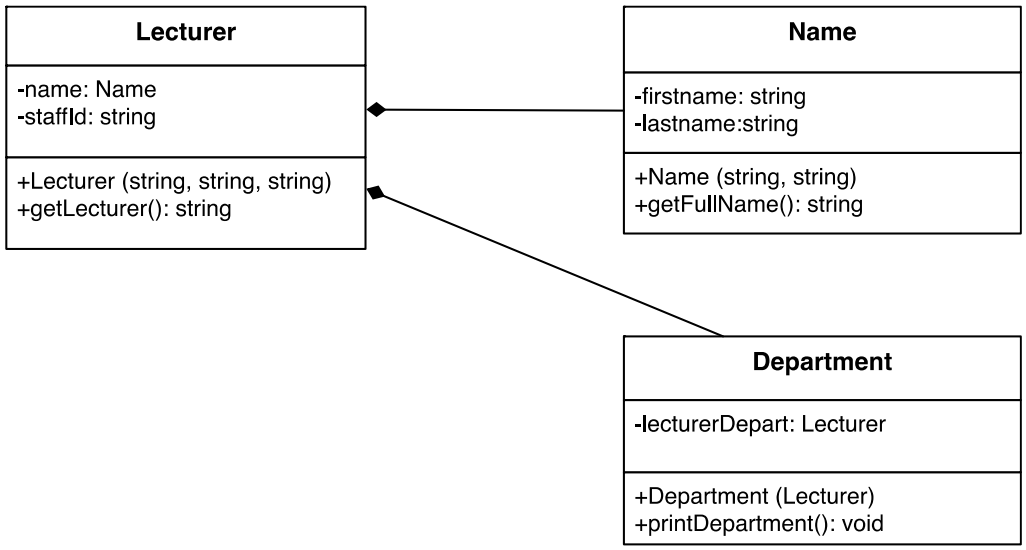
A



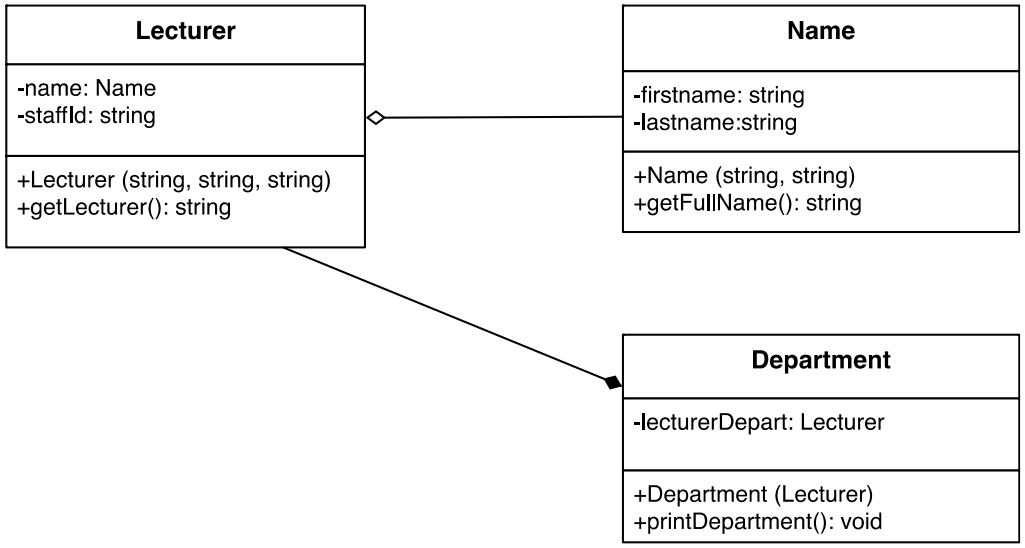
B



C



D



2. Given the following fragment of code, identify the relationship between the classes that the class definition represents.

```
1   int main(){
2     Course cs1("OOP","SCP3103",3);
3     Course cs2("TP1","SCJ1013",3);
4     Course cs3("TP2","SCJ1213",3);
5     Course cs4("KP","SCP2113",3);
6
7     Student s1 ("ALI","AC1234","2SCS");
8     s1.registerCourse(cs1);
9     s1.registerCourse(cs2);
10    s1.printAllInfo();
11
12    Student s2("AHMAD","AC1122","3SCK");
13    s2.registerCourse(cs1);
14    s2.registerCourse(cs3);
15    s2.registerCourse(cs4);
16    s2.printAllInfo();
```

```
17
18      return 0;
19  }
```

A Composition

B Aggregation

C Inheritance

D Polymorphism

INHERITANCE

LOT (3 of 8 Questions will be chosen randomly)

1. Which is the correct syntax of inheritance?

A
```
class derived_classname : base_classname{
/*define class body*/ };
```

B
```
class base_classname : derived_classname{
/*define class body*/ };
```

C
```
class derived_classname : access_specifier
base_classname{
/*define class body*/ };
```

D
```
class base_classname : access_specifier
derived_classname{
/*define class body*/ };
```

2. In case of inheritance where both base and derived class are having constructor and destructor, then which of the following are TRUE?

i. Constructors are executed in their order of derivation
ii. Constructors are executed in reverse order of derivation
iii. Destructors are executed in their order of derivation
iv. Destructors are executed in reverse order of derivation

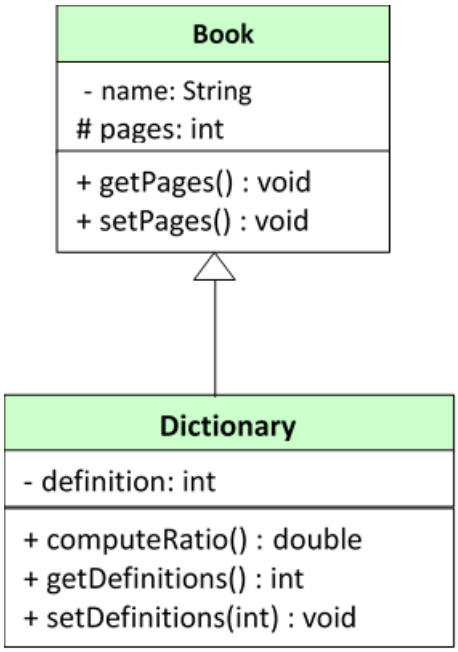
A ii and iv

B i and iii

C i and iv

D ii and iii

3. Given inheritance relationship below, which statement is CORRECT?



A Book can access pages, getPages(), setPages(), computeRatio() and definition.

B Book owns pages, getPages(), setPages(), computeRatio(), getDefinitions(), definition, computeRation().

C Dictionary can access pages, name, getPages(), setPages().

D Dictionary owns name, pages, getPages(), setPages(), computeRatio(), getDefinitions(), definition, computeRation().

4. Which of the following is CORRECT syntax for defining a new class Car based on the superclass Vehicle?

A
```
class Car extends Vehicle { //additional definitions go here }
```

B
```
class Car implements Vehicle { //additional definitions go here }
```

C
```
class Car : class Vehicle { //additional definitions go here }
```

D
```
class Car : public Vehicle { //additional definitions go here }
```

5. What will be the order of execution of base class constructors in the following class definition?

```
class A: public B, public C {…};
```

A
```
B(); C(); A();
```

B `C(); B(); A();`

C `A(); B(); C();`

D `B(); A(); C();`

6. Based on the following code segment, identify the FALSE statement related to protected keyword.

```
1  class Car: protected Vehicle
2  {
3     protected:
4        int engineCapacity;
5        double price;
6  };
```

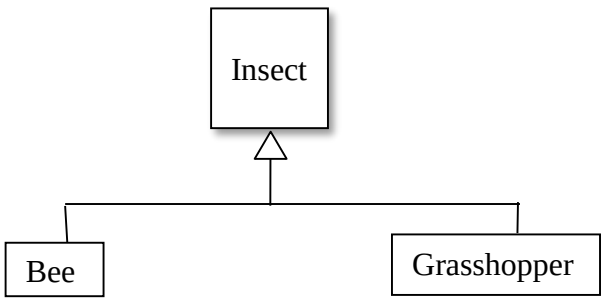
A The keyword protected at Line 1 is used for inheritance purposes. It allows the derived class, Car, to inherit protected and public members of the base class, Vehicle.

B The keyword protected at Line 3 acts as an access specifier.

C The keyword protected at Line 1 is used for access specifier purposes. It allows the data members, engineCapacity and price, to be accessible by the instance of the class Car or its child classes.

D There is a difference between the use of the keyword protected at Line 1 and the use of the keyword protected at Line 3.

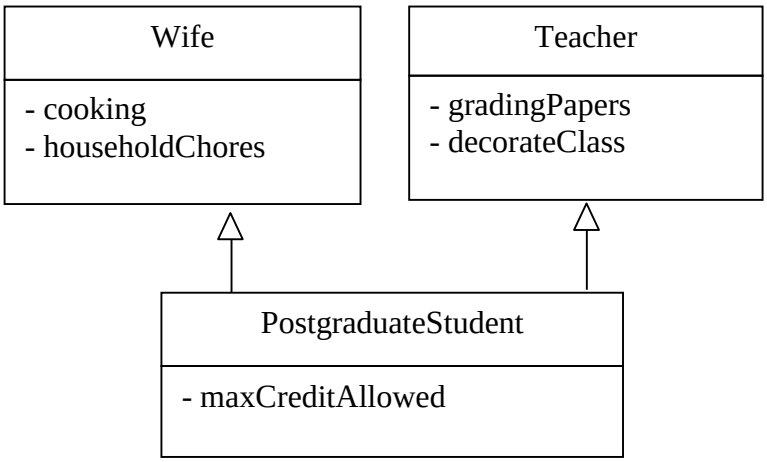
7. Based on UML diagram below, what would be the possible code for inheritance concept applied?



A
```
class Insect
{  . . . };
class Bee : public Insect
{  . . . };
```

```
    class Grasshopper : public Insect
    {  . . . };
B   class Bee
    {  . . . };
    class Insect : public Bee
    {  . . . };
    class Grasshopper : public Bee
    {  . . . };
C   class Grasshopper
    {  . . . };
    class Insect : public Grasshopper
    {  . . . };
    class Bee : public Grasshopper
    {  . . . };
D   class Insect
    {  . . . };
    class Insect : public Bee
    {  . . . };
    class Insect : public Grasshopper
    {  . . . };
```

8. In a multiple inheritance concept, what would be the most appropriate line to represent the UML diagram below?



A `class PostgraduateStudent: public Wife, public Teacher;`

B `class PostgraduateStudent: public Wife, public Teacher`

C
```
{ class PostgraduateStudent: public Wife, public Teacher
}
```

D
```
class PostgraduateStudent: public Wife(), public
Teacher()
```

HOT (3 of 7 Questions will be chosen randomly)

1. How can you make the private members inheritable?

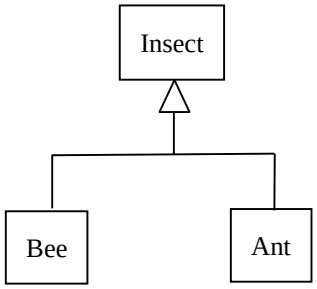
A By making their visibility mode as public only

B By making their visibility mode as protected only

C By making their visibility mode as private in derived class

D It can be done both by making their visibility mode as public or protected

2. Which two classes shows inheritance correctly?




```
i.   class Ant: public Bee {
       private : string name;
     };
ii.  class Ant: public Insect {
       private : string name;
     };
iii. class Bee: public Insect {
       string name;
       void move();
     };
iv.  class Bee: public Ant {
       string name;
       void move();
     };
```

A ii, v

B i, iii

C ii, iii

D di, iv

3. Predict the output of the following program segment:

```
1  class A {
2    public:
3      A(int n = 1) : ia(n) { cout << "A() "; }
4    protected:
5      int ia;
6  };
7  class B : public A {
8    public:
9      B(int n) : ib(n) { cout << "B() "; }
```

```
10    private:
11      int ib;
12  };
13  int main()
14  {
15     B b(2);
16     return 0;
17  }
```

A `B A`

B `A B`

C `B() A()`

D `A() B()`

4. Choose a CORRECT statement based on the codes below:

```
1  class Car {};
2  class NormalCar : public Car {};
3  class ElectricCar : public Car {};
4  class HybridCar : public NormalCar, public ElectricCar
5  {};
```

A A HybridCar object will not contain a single copy of a Car object.

B NormalCar and ElectricCar objects share a common Car object and each having its own behaviours.

C This code binds at execution time.

D Method used is dynamically bound.

5. What will be the output for the following program segment?

```
1      class student {
2          public:
3          int rno , m1 , m2 ;
4          void get()
5          {
6              rno = 15, m1 = 10, m2 = 10;
7          }
8      };
9      class sports {
10         public:
```

```
11          int sm;
12          void getsm()
13          {
14              sm = 10;
15          }
16      };
17      class statement:public student,public sports {
18          int total,avg;
19          public:
20          void display()
21          {
22              total = (m1 + m2 + sm);
23              avg = total / 3;
24              cout << total;
25              cout << avg;
26          }
27      };
28      int main() {
29          statement obj;
30          obj.get();
31          obj.getsm();
32          obj.display();
33      }
```

A 1030

B 3010

C 2010

D 1010

6. What will be the output for the following program segment?

```
1   class Husband {
2   public:
3     Husband()
4     { cout << " Husband's constructor called" << endl; }
5   };
6
7   class Wife {
8   public:
9     Wife()
10    { cout << "Wife's constructor called" << endl; }
11  };
12
13  class Child: public Husband, public Wife {
14  public:
15    Child()
16    { cout << "Child's constructor called" << endl; }
17  };
```

```
18
19  int main() {
20    Child Smith;
21    return 0;
22  }
```

A
```
Husband's constructor called
Wife's constructor called
Child's constructor called
```

B Compilation error

C
```
Wife's constructor called
Husband's constructor called
Child's constructor called
```

D
```
Child's constructor called
Husband's constructor called
Wife's constructor called
```

7. Find an error in the following fragment of code and fix the error.

```
1   class Shape {
2      public:
3            int a;
4            Shape(int b)
5            { a = b; }
6   };
7
8   class Rectangle: public Shape {
9     public:
10       int c;
11       Rectangle(int d): Shape(d+d+d+d) {c = d;}
12  };
13
14  class Triangle: public Shape {
15     public:
16       int e;
17       Triangle(int f):Rectangle(f+f+f) {e = f;}
18  };
```

A Error in Line 8. The corrected code as below:
```
class Rectangle {
public:
  int c;
  Rectangle(int d): Shape(d+d+d+d) {c = d;}
};
```

B Error in Line 11. The corrected code as below:

```
class Rectangle: public Shape {
public:
  int c;
  Rectangle(int d): Shape(d) {c = d;}
};
```

C Error in Line 14. The corrected code as below:

```
class Triangle {
public:
  int e;
  Triangle(int f):Rectangle(f+f+f) {e = f;}
};
```

D Error on Line 18. The corrected code as below:

```
class Triangle: public Shape {
public:
  int e;
  Triangle(int f):Shape(f+f+f) {e = f;}
};
```

POLYMORPHISM

LOT (3 of 8 Questions will be chosen randomly)

1. Which is the correct declaration of pure virtual function in C++?

A `virtual void func = 0;`

B `virtual void func() = 0;`

C `virtual void func(){0};`

D `void func() = 0;`

2. Run time binding is related to _____.

A function overriding

B operator overloading

C A and B

D None of the above

3. Which polymorphism behavior do you see in the following class definition?

```
1  class Draw {
2    void background(int x) {}
3    void background(int x, int y) {}
```

```
4     void background(int x, int y, int z) {}
5   };
```

A Function overriding

B Function overloading

C Constructor overloading

D Constructor polymorphism

4. In the following program segment, which functions overload name() function?

```
1   class Fruit {
2     public:
3       void name() {
4         cout << "Fruit's Name"; }
5   };
6
7   class Banana: public Fruit {
8     //name function here
9   };
```

```
i.   void name(){cout << "Fruit's Name");
ii.  void name(string n){ cout << "Fruit's Name"<<n);
iii. void name(){cout << "Banana");
iv.  void name(int m){cout << "Fruit's Name" << m);
```

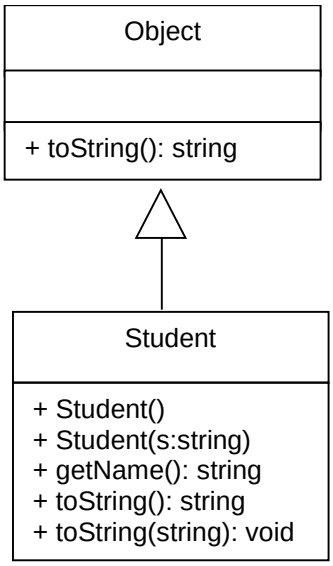
A i, ii

B i, iii

C ii, iv

D All of the above

5. Based on the diagram below, which statements implement overriding concept?




```
i.   string toString(){return name;}
ii.  void toString(){cout << name);}
iii. string toString(string n){ return n; }
iv.  void toString(string s){cout << s); }
v.   string toString(){return "ok";}
```

A i, iii, v

B ii, iv

C iv, v

D i, v

6. Which class or set of classes can illustrate polymorphism in the following code?

```
1  abstract class student {
2     public :
3       int marks;
4       int calc_grade();
5  };
6
7  class topper: public student {
8     public :
9       int calc_grade() {
10        return 10;
11      }
12 };
13
14 class average: public student {
15    public :
16      int calc_grade() {
17        return 20;
```

```
18        }
19  };
20
21  class failed {
22     int marks;
23  };
```

A Only class student can show polymorphism

B Only class student and topper together can show polymorphism

C All class student, topper and average together can show polymorphism

D Class failed should also inherit class student for this code to work for polymorphism

7. Given the following program segment, which is the appropriate line to change from static to dynamic binding?

```
1   class Base {
2      public:
3         void show() { cout<<" In Base \n"; }
4   };
5
6   class Derived: public Base {
7      public:
8         void show() { cout<<"In Derived \n"; }
9   };
10
11  int main(void) {
12     Base *bp = new Derived;
13
14     bp->show();
15     return 0;
16  }
```

A Line 1

B Line 3

C Line 6

D Line 8

8. Given the following program segment, which line applies the overridden method?

```
1   class Base
```

```
2   {
3     protected:
4        string name;
5     public:
6        Base(string n): name (n) {}
7        void set(string n) {name = n;}
8        void set() { cout << name;}
9        void print() { cout << "Base's name = " << name;}
10       virtual void whoAmI { cout << "Base class";}
11  };
12
13  class Derived: public Base
14  {
15    public:
16       Derived(string n) : Base(n){}
17       void print(){ cout << "Derived's name = "
18                           << name;}
19       void whoAmI() { cout << "Derived class";}
20  };
```

A Line 8

B Line 10

C Line 17

D Line 19

HOT (3 of 7 Questions will be chosen randomly)

1. Identify the statement that would produce error in the following program segment:

```
1   class Disney {
2     public:
3       Disney(){}
4       virtual int getNumber() const {return 0;}
5   };
6
7   class Trolls: public Disney {
8     private:
9       int animator;
10      int cast;
11    public:
12      Troll(int numb) {animator = numb;}
13      int getNumber() const {return animator*cast;}
14      void printAnimator() const {
15        cout << "Number of animator used:" << animator;
16  };
17
18  int main()
19  {
20    Disney *d;
```

```
21    Troll t(10);
22
23    d = &t;
24    cout << "Area = " << d->getNumber() << endl;
25    d->printAnimator();
26    return 0;
27  }
```

A `virtual int getNumber() const`

B `d = &t;`

C `d->getNumber()`

D `d->printAnimator();`

2. Choose the CORRECT syntax in turning the class Raya to be an abstract class by making the function getEid pure virtual.

A
```
class Raya {
public:
   virtual int getEid() const = 0;
};
```

B
```
class Raya {
public:
   virtual int getEid() const ;
};
```

C
```
class Raya {
public:
   virtual int getEid() const = 0 {};
};
```

D
```
class Raya
public:
   virtual getEid() const int = 0;
};
```

3. Identify the statement that would produce error in the following program segment:

```
1   class Base {
2     public:
3       void show() { cout << "In Base"; }
4   };
5
6   class Derived: public Base {
7     public:
8       int x;
9       void show() { cout << "In Derived"; }
```

```
10      Derived() { x = 10; }
11  };
12
13  int main() {
14    Base *bp, b;
15    Derived d;
16    bp = &d;
17    bp->show();
18    cout << bp->x;
19    return 0;
20  }
```

A Error in line 10. The reason is the base class does not have a constructor.

B Error in line 16. The reason is the base class pointer cannot point to a derived class object.

C Error in line 17. The reason is the base class pointer cannot point to a function of derived class.

D Error in line 18. The reason is the base class pointer cannot access derived class member without having it.

4. Identify the statement that would produce error in the following program segment:

```
1   class Test {
2     int x;
3     public:
4       virtual void show() = 0;
5       int getX() { return x; }
6   };
7
8   int main(void) {
9     Test t;
10    return 0;
11  }
```

A `Test t;`

B `virtual void show() = 0;`

C `int getX()`

D No error found

5. What will be the output for the following program segment?

```
1   class Base {
2     protected:
3       int x;
4     public:
5       virtual void fun() = 0;
6       Base(int i) { x = i; }
7   };
8
9   class Derived: public Base
10  {
11    int y;
12    public:
13      Derived(int i, int j): Base(i) { y = j; }
14      void fun() {
15        cout << "x = " << x << ", y = " << y; }
16  };
17
18  int main(void) {
19    Derived d(4, 5);
20    d.fun();
21    return 0;
22  }
```

A `x = 4, y = 5`

B `y = 4, x = 5`

C `x = 4`

D Compilation error.

6. Modify the following fragment of code to change the Student class becomes an abstract base class.

```
1   class Student {
2      public:
3         int semester;
4         totalYear();
5   };
6
7   class Undergraduate: public Student {
8      public:
9         int totalYear(){ return 4; }
10  };
11
12  class Postgraduate: public Student {
13     public:
14        int totalYear(){ return 3; }
15  };
```

A
```
virtual int totalYear();
```

B
```
virtual int totalYear() = 0;
```

C
```
pure virtual int totalYear() = 0;
```

D
```
virtual int totalYear() = 0 {};
```

7. Given a base class named A, which defined as follows, identify which derived class that contain an overridden function of myMessage():

```
1  class A {
2    public:
3      virtual void myMessage() {
4        cout << "Base class"; }
5  };
```

A
```
class B {
  public:
    virtual void myMessage() {
      cout << "Derived class"; }
};
```

B
```
class B {
  public:
    void myMessage() {
      cout << "Derived class"; }
};
```

C
```
class B: public A {
  public:
    virtual void myMessage() {
      cout << "Derived class"; }
};
```

D
```
class B: public A {
  public:
    void myMessage() {
      cout << "Derived class"; }
};
```

EXCEPTION

LOT (1 of 2 Questions will be chosen randomly)

1. Which of the following is the most general exception handler that catches exception of 'any type'?

A `catch(std::exception)`

B `catch(...)`

C `catch(std::any_exception)`

D `catch()`

2. Which of these keywords is part of exception handling?

i. `try`
ii. `finally`
iii. `thrown`
iv. `catch`

A i, ii, iv

B i, iii, iv

C ii, iii, iv

D All of the above

HOT (3 of 8 Questions will be chosen randomly)

1. Given the following program segment:

```
1   class CalculateCpaException: public exception
2     class Student {
3       public:
4         void calculateCpa() throws CalculateCpaException
5         {
6           // …
7           throw new CalculateCpaException;
8           //….
9         }
10  };
11
12  class School {
13    public: void Cpa() {
14      new Student.calculateCpa(); }
15  };
```

Which of the following statements is CORRECT?

i. This code will compile without any problems.
ii. This code will compile if in function Cpa() we return a boolean instead of void.

iii. This code will compile if we add a try-catch block in Cpa().
iv. This code will compile if we add throws CalculateCpaException in the signature of function Cpa().

A i, iv

B ii, iii

C ii, iv

D iii, iv

2. Given the following program segment, which statements sets are correct to produce the given output?

Output:

```
Inside try x
Exception caught x
After catch x
```

```
1  int x = -1;
2  try {
3    cout << "i. ……";
4    if (x < 0) {
5       throw x;
6       cout << "ii. ……"; }
7  }
8
9  catch (int x ) {
10   cout << "iii. ……";
11 }
12
13 cout << "iv. ……";
```

A i. Exception caught x, ii. Inside try x, iii. After throw x, iv. After catch x

B i. Inside try x, ii. After throw x, iii. Exception caught x, iv. After catch x

C i. Inside try x, ii. Exception caught x, iii. After catch x, iv. After throw x

D i. Exception caught x, ii. Inside try x, iii. After throw x, iv. After catch x

3. Complete the following program segment by filling in the blank at line 10.

```
1  int x = -1;
2
3  try {
```

```
4     if (x < 0) {
5       throw x; }
6     else {
7       cout << x; }
8   }
9
10  _________________ {
11    cout << "Exception occurred: Thrown value is"
12         << x << endl;
13  }
```

A `catch (int x)`

B `catch ()`

C `catch (throw x)`

D `catch (exception& e)`

4. What will be the output for the following program segment?

```
1   class Parent {};
2   class Child: public Parent {};
3   int main() {
4      Child c;
5      try {
6        throw c;
7      }
8      catch(Child ex) {
9        cout << "Caught Child Exception ";
10     }
11     catch(Parent ex) {
12       cout << "Caught Parent Exception ";
13     }
14     return 0;
15  }
```

A `Caught Parent Exception`

B `Caught Child Exception`

C `Compilation Error`

D `Caught Parent Exception Caught Child Exception`

5. What will be the output for the following program segment?

```
1   class myexception: public exception {
```

```
2     virtual const char* what() const throw() {
3       return "My exception happened"; }
4   } myex;
5
6   int main () {
7     try {
8       throw myex;
9     }
10    catch (exception& e) {
11      cout << e.what() << '\n';
12    }
13    return 0;
14  }
```

A `My exception happened`

B `No exception happened`

C `Standard exception`

D `Myex happened`

6. What will be the output for the following program segment?

```
1   try {
2     throw 33;
3   }
4
5   catch (int e) {
6     cout << "An exception occurred. Exception Nr. "
7          << e << '\n';
8   }
```

A `An exception occurred. Exception Nr. 33`

B `An exception occurred. Exception Nr.`

C `33 An exception occurred. Exception Nr.`

D
```
33
An exception occurred. Exception Nr.
```

7. What will be the output for the following program segment?

```
1   class Final {
2     public:
3       Final() {
4         cout << "Constructor of Final" << endl; }
```

```
5       ~ Final() {
6         cout << "Destructor of Final" << endl; }
7   };
8
9   int main() {
10    try {
11      Final f1;
12      throw 22;
13    }
14
15    catch(int y) {
16      cout << "Caught " << y << endl; }
17  }
```

A
```
Constructor of Final
Destructor of Final
Caught 22
```

B
```
Constructor of Final
Caught 22
Destructor of Final
```

C
```
Caught 22
Constructor of Final
Destructor of Final
```

D
```
Constructor of Final
Caught
Destructor of Final
```

8. What will be the output for the following program segment?

```
1   try {
2     try {
3       throw 20;
4     }
5
6     catch (int n) {
7       cout << "Inner Catch\n";
8       throw;
9     }
10  }
11
12  catch (int x) {
13    cout << "Outer Catch\n";
14  }
```

A
```
Inner Catch
```

B
```
Outer Catch
```

C
```
Inner Catch
Outer Catch
```

D
```
Outer Catch
Inner Catch
```