

**Q.1** Which of the following are examples of Agile Software Development Process?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☒ ☒ Incremental Development
  - ☐ Waterfall Model
  - ☒ ☒ Extreme Programming
  - ☐ Reuse-Oriented software Engineering
- 

**Q.2** Which of the following are confidentiality property related to an ATM software system?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☐ When a user checks for her Account's balance with her ATM card and valid PIN, she is shown the correct account balance
  - ☐ A legitimate user should always be able to withdraw money with her ATM card and correct PIN
  - ☐ The electrical power of the ATM should never be shut down
  - ☒ ☒ A user cannot find the balance in his friend's account without having both his ATM card and correct PIN
- 

**Q.3** Suppose you want to develop a software for a room temperature control system. The system has the following requirement:

"The system should never allow the room temperature to go above 23C"

To capture the above specification formally using Linear Temporal Logic, which operator do you need to use?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☐ ◇ (eventually)
  - ☐ ○ (next)
  - ☐ *U* (until)
  - ☒ ☒ □ (always)
-

**Q.4** Which ones of the following are instances of special purpose software?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☒ ☒ Software to control a spacecraft for a MARS mission
  - ☒ ☒ A software created by a shop-keeper to run his day-to-day business smoothly
  - ☐ ☐ Linux OS
  - ☐ ☐ Google Map
- 

**Q.5** Which of the following requirements are verifiable?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☐ ☐ The ATM system is easy to use by general customers
  - ☒ ☒ The server system should not be down for more than one hour per day
  - ☐ ☐ When the room heating system is on, the system will be able to maintain the temperature of the room in such a way that it is comfortable for the room occupants
  - ☒ ☒ When the road is free, the autonomous vehicle can achieve a velocity of 100 kmph from zero velocity within 10 secs
- 

**Q.6** Which of the following group of people need to read the system requirements but not the user requirements?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

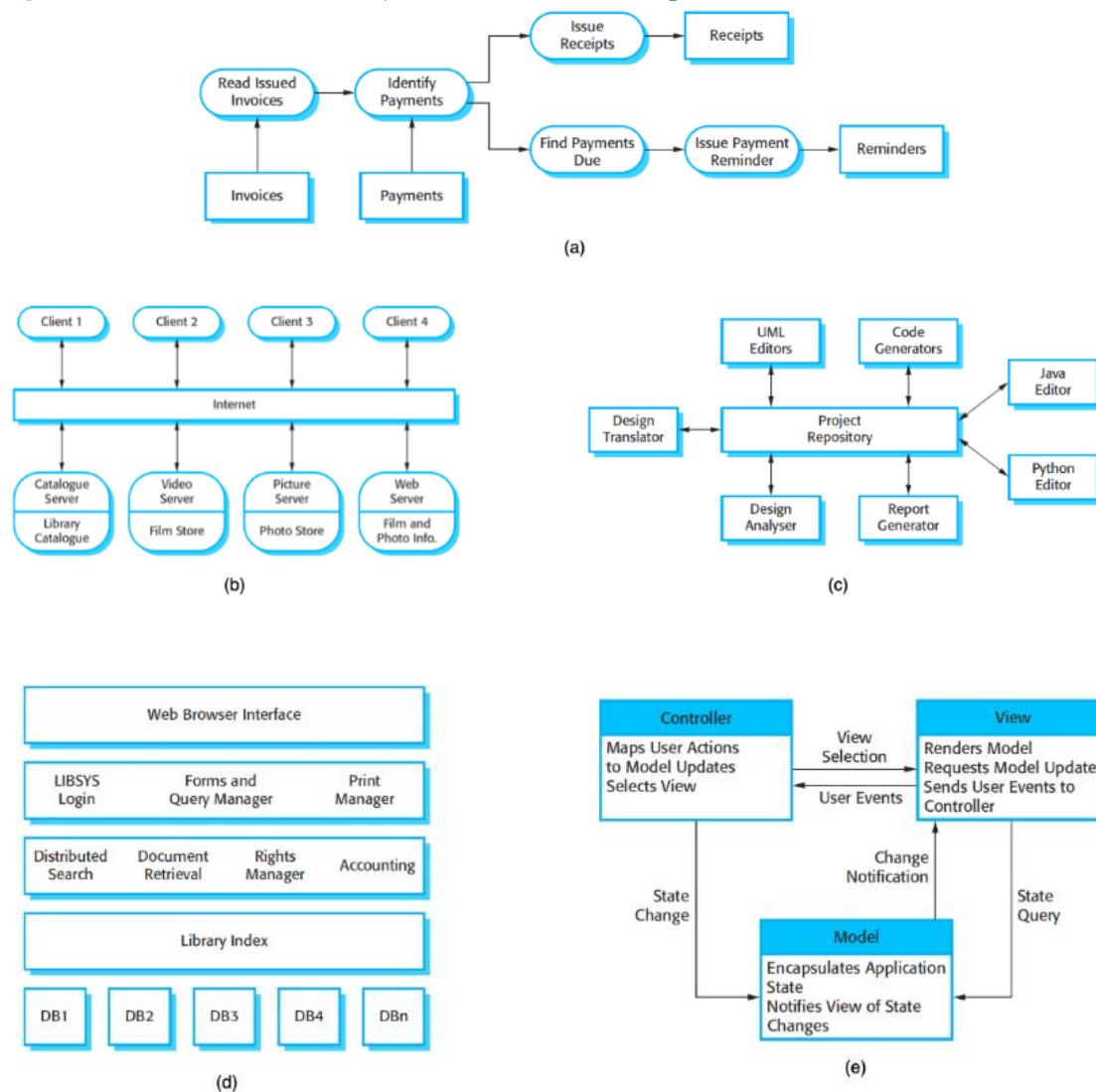
- ☐ ☐ System end-users
  - ☐ ☐ Client managers
  - ☒ ☒ Software developers
  - ☐ ☐ System architects
-

**Q.1** In the class hierarchy of a software system, Class A is the parent class of Class B and Class C. Which of the following is/are always true?

Max. score: 1; Neg. score: 0.25; Your score: 1

- ☐ The objects of Class B and Class C have equal number of attributes
- ☐ The objects of the three classes have no common attributes
- ☐ An object of class A has more attributes than an object of class B or class C
- ☒ An object of class B has equal or more attributes than class A

**Q.2** Consider the architectural patterns shown in the figure below.



Which one of the following provides the correct labeling for the architectural patterns?

Max. score: 1; Neg. score: 0.25; Your score: 1

- ☐ (a) : layered
- (b) : client-server
- (c) : repository
- (d): pipe and filter
- (e): model-view-controller

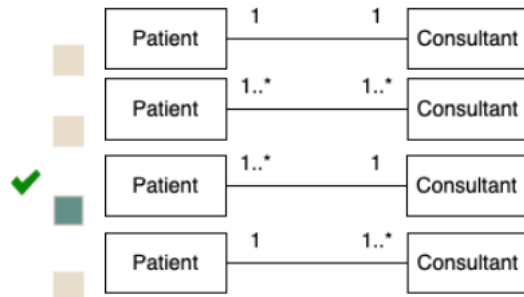
- ☐ (a) : layered
- (b) : client-server
- (c) : repository
- (d): layered
- (e): model-view-controller

- ✓ ☒ (a) : pipe and filter
- (b) : client-server
- (c) : repository
- (d): layered
- (e): model-view-controller

- ☐ (a) : pipe and filter
  - (b) : repository
  - (c) : client-server
  - (d): layered
  - (e): model-view-controller
-

**Q.3** A patient can visit only one consultant. However, a consultant can deal with many patients. Which of the following captures the association of the classes patient and consultant correctly?

Max. score: 1; Neg. score: 0.25; Your score: 1



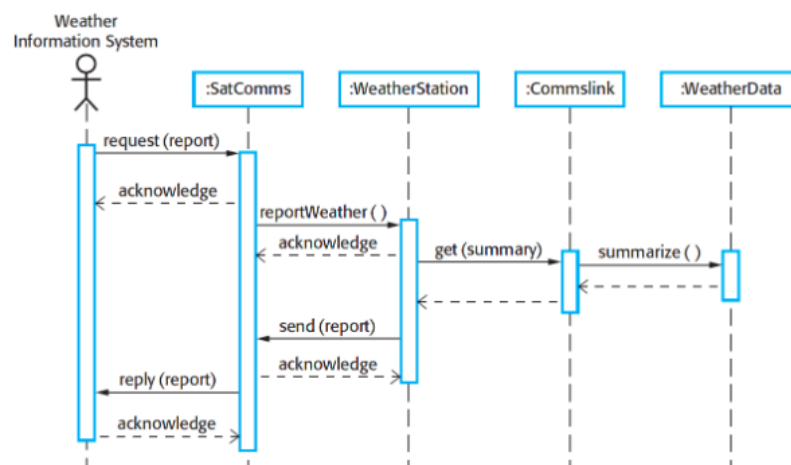
**Q.4** Suppose you have a base (parent) class "Shape" and two derived (children) classes "Square" and "Circle". Which of the following attributes are suitable to be included in the base class "Shape"?

Max. score: 1; Neg. score: 0.25; Your score: 1

- ☒ Area
- ☒ Perimeter
- ☐ Length of the sides
- ☐ Radius

**Q.5** A synchronous message is the one that requires its sender to wait for a response to the message before the sender can continue with its operations.

Consider the sequence diagram shown below.



How many synchronous messages are there in the diagram?

Max. score: 1; Neg. score: 0.25; Your score: 1

- ☐ 2
- ☐ 12
- ☐ 4
- ☒ 6

---

**Q.6** Which of the following diagrams capture the runtime behavior of one object?

*Max. score: 1; Neg. score: 0.25; Your score: -0.25*

- ☐ Use-case diagram
  - ☒ State Diagram
  - ☐ Class diagram
  - ☐ Sequence Diagram
-

**Q.1** Consider the following class:

-----

```
class A {
    int num;
    public:
        A () {num = 10;}
        friend int add1(A a);
        int add2(A a);
        int getnum();
        void print();
};
```

-----

"This" pointer is accessible from which of the following function(s)?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☒ ☒ print
- ☒ ☒ getnum
- ☐ ☐ add1
- ☒ ☒ add2

---

**Q.2** Which of the following programs will produce "5" as output?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

☐ #include <iostream>

using namespace std;

namespace A {

    int var = 10;  
}

namespace B {

    int var = 5;  
}

int main()

{  
    using namespace A;  
    cout << var << endl;  
}

✓  #include <iostream>

```
using namespace std;
```

```
namespace A {  
    int var = 10;  
}
```

```
namespace B {  
    int var = 5;  
}
```

```
int main()  
{  
    using namespace A;  
    int var = 5;  
    cout << var << endl;  
}
```

✓  #include <iostream>

```
using namespace std;
```

```
namespace A {  
    int var = 10;  
}
```

```
namespace B {  
    int var = 5;  
}
```

```
int main()  
{  
    using namespace B;  
    cout << var << endl;  
}
```



✓ ■ #include <iostream>

```
using namespace std;
```

```
namespace A {
```

```
    int var = 10;  
}
```

```
namespace B {
```

```
    int var = 5;  
}
```

```
int main()
```

```
{  
    int var = 10;  
    cout << B::var << endl;  
}
```

---

**Q.3** Consider the following class:

-----

```
class Box{  
    private:  
        double length; // Length of a box  
        double breadth; // Breadth of a box  
    public:  
        double height; // Height of a box  
        static int objectCount;  
        // Constructor definition  
        Box(double l = 2.0, double b = 2.0, double h = 2.0) {  
            cout << "Constructor called." << endl;  
            length = l; breadth = b; height = h;  
            objectCount++;  
        }  
  
        double Volume() {  
            return length * breadth * height;  
        }  
        static void print_members() {  
            // print members  
        }  
};
```

-----  
Which variable(s) declared in the class can be accessed from the function print\_members() ?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☒ ☐ objectCount  
☐ height  
☐ length  
☐ breadth

---

**Q.4** Which of the following programs will throw compilation error?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

```
☐ #include <iostream>

using namespace std;

class A {
    int y;

    public:
        int x;
        int getx () {
            return x;
        }
        void setx (int num) {
            x = num;
        }
};

int main ()
{
    A a;
    a.x = 5;
    cout << a.x << endl;
}
```


```
#include <iostream>

using namespace std;

class A{
    int x;

    public:
        int getx () {
            return x;
        }
        void setx (int num) {
            x = num;
        }
};

int main ()
{
    A a;
    a.setx(5);
    cout << a.getx() << endl;
}
```

✓  #include <iostream>

```
using namespace std;

class A{
    int x;

    public:
        int getx () {
            return x;
        }
        void setx (int num) {
            x = num;
        }
};

int main ()
{
    A a;
    a.x = 5;
}
```

✓  #include <iostream>

using namespace std;

```
class A {
    int x;

    public:
        int getx () {
            return x;
        }
        void setx (int num) {
            x = num;
        }
};
```

```
int main ()
{
    A a;
    cout << a.x << endl;
}
```

---

**Q.5** Consider the following program:

-----

#include <iostream>

using namespace std;

```
class Line {
    private:
        int length;
    public:
        Line( int len );
        int getLength( void );
        ~Line();
};
```

```
Line::Line(int len) {
    cout << "Normal constructor" << endl;
    length = len;
}
```

```
int Line::getLength( void ) {
    cout << "Returning length.." << endl;
    return length;
}
```

```

Line::~~Line(void) {
    cout << "Deleting object!" << endl;
}

int main() {
    Line line1(10);
    Line line2 = line1;
    line1.getLength();
    line2.getLength();
    return 0;
}

```

-----

How many function invocations happen during the execution of this program?

*Max. score: 1; Neg. score: 0.25; Your score: -0.25*

- ☒ 6
  - ☐ 5
  - ☐ 3
  - ☐ 4
- 

**Q.6** Consider the following partially shown class:

```

Class A {
    int num;
    public:
        ....
},

```

Which one(s) of the following could be partially written friend function(s) of class A?

*Max. score: 1; Neg. score: 0.25; Your score: 0*

- ☐ double A::func4 (double y) {
 ....
 }
- ☒ double func3 (A a) {
 ....
 }

✓ ☐ void func1 (A a) {

....

}

☐ void A:: func2 (int x) {

....

}

---

**Q.1** Consider the following inheritance:

```
class Rectangle: Shape {
```

```
....
```

```
};
```

The private members of the class Shape are what in the class Rectangle?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☐ private
- ☒ inaccessible
- ☐ protected
- ☐ public

---

**Q.2** Consider the following class:

```
-----
```

```
class Shape {  
    int id;  
    protected:  
        int width;  
        int height;  
    public:  
        Shape(int num) {id = num;}  
        void setWidth(int w) {  
            width = w;  
        }  
        void setHeight(int h) {  
            height = h;  
        }  
        friend void printArea(Shape s) {  
            cout << s.width * s.height << endl;  
        }  
};  
-----
```

Suppose a class Rectangle is derived from the class Shape through public inheritance. Which of the functions of class Shape are available to the class rectangle?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☐ Shape
  - ☐ printArea
  - ✓ ☒ setWidth
  - ✓ ☒ setHeight
- 

**Q.3** Multiple inheritance refers to which of the following?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☐ Deriving a child class from a parent class using multiple access specifiers
  - ☐ Deriving multiple children classes from multiple base classes
  - ☐ Deriving multiple children classes from one base class
  - ✓ ☒ Deriving a child class from multiple parent classes
- 

**Q.4** Consider the following class:

-----

```
class Shape {  
    protected:  
        int width, height;  
    public:  
        Shape(int a = 0, int b = 0) {  
            width = a;  
            height = b;  
        }  
        virtual int area() = 0;  
};
```

-----

Consider the following two statements about the above class:

S1: For this class, there is a definition of the function "area", which looks like the following:

```
int Shape::area () {
```

....



}

S2: An invocation of the function area () in the program will always return 0.

Which of the above statements is/are true?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☐ Only S1
- ☒ Neither S1 nor S2
- ☐ Only S2
- ☐ Both S1 and S2

---

**Q.5** Consider the following incomplete program with an incomplete class definition:

```
-----  
  
#include <iostream>  
  
using namespace std;  
  
class Box{  
    int capacity;  
public:  
    Box(){}  
    Box(double capacity){  
        this->capacity = capacity;  
    }  
    ....  
};  
  
....  
  
int main(int argc, char const *argv[])  
{  
    Box b1(10);  
    Box b2 = Box(14);  
    if(b1 == b2){  
        cout<<"Equal";  
    }  
    else{  
        cout<<"Not Equal";  
    }  
    return 0;  
}  
  
-----
```

Which one of the following is the correct prototype of the function to be included in the class?

Max. score: 1; Neg. score: 0.25; Your score: 1

- ☐ `bool operator==( );`
  - ☐ `bool operator==( Box b1, Box b2);`
  - ☒ `bool operator==(Box b);`
  - ☐ `Box operator==( );`
- 

**Q.6** Which of the following four programs produce the following output?

-----

Inside try  
After catch

-----

Max. score: 1; Neg. score: 0.25; Your score: 1

```
#include <iostream>

using namespace std;

int main()
{
    int x = -1;
    try{
        cout << "Inside try \n";
        if (x < 0)
        {
            throw x;
            cout << "After throw \n";
        }
    }
    catch (int x) {
        cout << "Exception Caught \n";
    }

    cout << "After catch \n";
    return 0;
}
```

```
#include <iostream>
```

```
using namespace std;
```

```

int main()
{
    int x = -1;
    try{
        cout << "Inside try\n";
        if (x < 0)
        {
            cout << "After throw\n";
        }
    }
    catch (int x) {
        cout << "Exception Caught\n";
    }

    cout << "After catch\n";
    return 0;
}

```

✓ ■ #include <iostream>

using namespace std;

```

int main()
{
    int x = -1;
    try{
        cout << "Inside try\n";
        if (x > 0)
        {
            throw x;
            cout << "After throw\n";
        }
    }
    catch (int x) {
        cout << "Exception Caught\n";
    }

    cout << "After catch\n";
    return 0;
}

```

✓ ■ #include <iostream>

using namespace std;

```
int main()
{
    int x = -1;
    try{
        cout << "Inside try\n";
        if (x > 0)
        {
            throw x;
            cout << "After throw\n";
        }
    }
    catch (int x) {
    }

    cout << "After catch\n";
    return 0;
}
```

---

**Q.1** Execution of which of the following shell scripts will produce "0" as the output at the terminal?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☒ ☐ echo 0
  - ☒ ☐ a=\$(( 100-99 ))  
(( a-- ))  
echo \$a
  - ☐ [ "abc" = "acb" ]  
echo \$?
  - ☒ ☐ [ 100 -eq 100 ]  
echo \$?
- 

**Q.2** Which of the following symbols is used in for sequential execution of several unix commands on the command prompt, where the output of one command is used as the input for the next command?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☐ '%'
  - ☐ '#'
  - ☐ '@'
  - ☒ ☐ '|'
- 

**Q.3** Which of the following shell-scripts will produce 1 to 10 on the screen in the ascending order?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

```
☐ counter=0  
while [ $counter -le 10 ]  
do  
    echo $counter  
    ((counter++))
```

done

✓ ☒ for value in {1..10}

do

echo \$value

done

☐ counter=0

until [ \$counter -ge 10 ]

do

echo \$counter

((counter++))

done

☐ for value in \$(seq 0 10 1)

do

echo \$value

done

---

**Q.4** Which of the following programs will lead to an assertion violation?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

☐ #include <iostream>

using namespace std;

int main ()

{

int x = 10;

assert(x=10);


return 0;

}

 #include <iostream>

using namespace std;

```
int main ()
{
    int x = 10;
    assert(1);
    return 0;
}
```

✓  #include <iostream>

using namespace std;

```
int main ()
{
    int x = 10;
    assert(x>10);
    return 0;
}
```

✓  #include <iostream>

using namespace std;

```
int main ()
{
    int x = 10;
    assert(0);
    return 0;
}
```

---

**Q.5** Consider the following file named input.txt

-----

Learn os.

Learn unixos.

Learn unixunixos.

Learn osunix.

-----

Which of the following commands will produce all the four lines in the file on the screen?

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☒ ☐ `egrep "(unix)*os" input1.txt`
  - ☐ `egrep -w "(unix)*os" input1.txt`
  - ☐ `egrep -w "(unix)+os" input1.txt`
  - ☒ ☐ `egrep "(unix)?os" input1.txt`
- 

**Q.6** Suppose that the "ls" command on the terminal produces the following output:

```
-----  
file1.txt  
-----
```

What will be the output on the screen after executing the following command?

```
ls file1.txt file2.txt 2> stderr.txt
```

*Max. score: 1; Neg. score: 0.25; Your score: 1*

- ☐ `file1.txt file2.txt`
  - ☐ `ls: file2.txt: No such file or directory`
  - ☐ No output on the screen
  - ☒ ☐ `file1.txt`
-