Q.1 Which of the following languages are allowed for the CS253 class project in this semester?

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

- ✔ ■ Java
- ☐ C
- ☐ Python
- ✔ ■ C++

Q.1 Which of the following circumstances would require a plan-driven development of software?

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

- ✔ ☐ The development team is distributed across the globe
- ✔ ■ The life-cycle of the project is very long
- ✔ ■ The software product requires certification from an external agency
- ✔ ☐ The customers are not available during the development of the software

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Q.2 Which of the following circumstances would suggest the use of an agile software process?

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

- ✔ ■ It is important to enter the market as soon as possible to avoid competition
- ✔ ■ The requirement specifications are not very clear before developing some preliminary version of the system
- ☐ The system is safety-critical and required exhaustive validation
- ✔ ■ The customer is willing to be involved in the development process

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Q.1 Feasibility study is performed as part of the requirement engineering process to ensure that

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

- ✔ the software can be developed within the budget
- the software will be bug-free if developed
- ✔ the software will be useful for the organization
- the software will conform with the environment regulation

Q.2 Which of the requirements validation checks is/are the sole responsibility of the software customer?

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

- Consistency
- Verifiability
- ✔ Completeness
- Realism

Q.1 Which of the following information are available from a use case digram?

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

- The non-functional requirements related to the interaction, for example, the time required for an interaction
- ✔ The actors involved in some interactions with the system
- ✔ The name of the interactions
- The data transmission involved in the interactions

Q.2 Mathematical specification is useful for which of the following purposes?

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

- Automated generation of tests
- ✔ Formal Verification of the software
- ✔ Automated synthesis of the software
- Formal modeling of the software system

Q.1 Architecture design links which of the following pairs of software process activities?

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

- ✔ ■ Requirement engineering and design/modeling
- Requirement engineering and testing
- Design/modeling and implementation
- Implementation and testing

Q.2 An architectural pattern does not provide which of the following information?

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

- An example of the type of the system where the pattern is used
- Its advantages and disadvantages
- ✔ ■ An estimation of the development time when the pattern is used
- ✔ ■ An estimation of manpower and cost budget required for developing a software using the pattern

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Q.1 Suppose that you want to develop a web service for displaying weather information. The weather information is displayed on the website and updated at a regular interval. The information that is shown on the website varies from location to location. For example, if someone wants to check the weather of Kanpur, no information about snowfalls is provided.

Which of the following architecture patterns is best suitable for developing this web-based software?

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

- ✔ Model-View-Controller Architecture
- Repository Architecture
- ■ Client-Server Architecture
- Layered Architecture

Q.2 You want to develop control software for an autonomous vehicle. The software takes the images taken by the front cameras as input and produces the steering angle, braking, and acceleration amount as output. The input camera image is processed for detecting objects in front of the vehicle. The object types and locations are used to generate a motion plan. Finally, the motion plan is used to generate the final control outputs.

Which of the following architecture patterns is best suited for developing this control software?

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

- [ ] Layered Architecture
- [x] Pipe and Filter Architecture
- [ ] Repository Architecture
- [ ] Client-Server Architecture

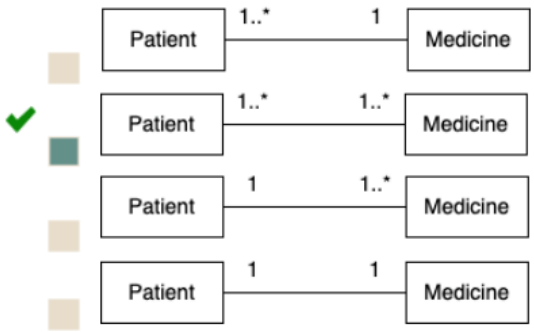
Q.1 In the class hierarchy of a software system, Class A is the parent class of Class B. Which of the following is/are always true?

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

- [x] An object of Class B is associated with more attributes than an object of Class A
- [ ] Class A cannot have any attribute
- [ ] An object of Class A is associated with more attributes than an object of Class B
- [ ] The objects of Class A and Class B have equal number of attributes.

Q.2 A patient can be given different medicines. On the other hand, a specific medicine can be prescribed for many patients. Which of the following captures the association of the classes patient and medicine correctly?

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



Q.1 A state machine of a software system has two state locations and two binary state variables, How many total states are there in the system?

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

- 2
- 4
- ✔ 8
- 6

Q.2 Which of the following UML models capture the dynamic behavior of software systems?

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

- Use-case diagram
- Class diagram
- ✔ State diagram
- ✔ Sequence diagram

Q.1 In a sequence diagram, a message communication shown by a dashed arrow with sticked arrowhead represents which of the following facts?

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

- The sender of the message waits for an acknowledgement from the receiver
- ✔ The sender of the message does not wait for a reply but can carry on with other processing
- The message may be lost or get corrupted on the way
- The message takes negligible time to reach the receiver

Q.2 Suppose you have a base (parent) class "Instrument" and three derived (children) classes "Thermometer", "Anemometer", and "Barometer". Which of the following attributes are suitable to be included in the base class "Instrument"?

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

- ✔ Instrument identification number
- ✔ The frequency of data collection
- Wind speed
- Temperature

Q.1 Consider the C++ program below:

```
#include <iostream>
using namespace std;
namespace first
{
        int val = 400;
}
namespace second
{
        int val = 300;
}
int val = 100;
```

```
int main()
{
  int val = 200;
  cout << val + first::val << endl;
  return 0;
}
```

What is the output printed by this program?

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

- 300
- 500
- ✔ 600
- 400

Q.2 Consider the following program:

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

class Tree {
  long leaf_count;
};

int main() {
 Tree t;
 t.leaf_count = 500000;
 cout << t.leaf_count << endl;
 return 0;
}
```

What will happen if you attempt to compile and run this program?

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

- ✔ The compiler will throw an error
- 500000 will be printed as output
- Compilation will be successful and the execution will terminate without printing any value
- The compilation will be successful but there will be a runtime error during execution

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Q.1 What is the return type of a constructor?

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

- char
- ✔ no return type
- int
- void

Q.2 Consider the following program:

```
#include <iostream>

using namespace std;

class Point

{

    int x, y;

    public:

        Point(int i = 0, int j = 0)

        {

            x = i;

            y = j;

        }

        int getX() { return x; }

        int getY() { return y; }
```

```
};

int main()
{
    Point p1;
    Point p2 = p1;
    cout << "x = " << p2.getX() << ", y = " << p2.getY() << endl;
    return 0;
}
```

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

- x = garbage value, y = garbage value
- ✔ x = 0, y = 0
- Runtime error
- Compilation error

Q.1 How many member functions are there in the following class?

```
class Box {
  double width;
  public:
    friend void printWidth( Box box );
    void setWidth( double wid );
    double getWidth();
    friend void printCost (Box box);
};
```

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

- ✔ 2
- 1
- 4
- 3

Q.2 Which of the following pointers refers to the object calling a member function?

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

- ✔ This Pointer
- Static Pointer
- Object Pointer
- Null Pointer

Q.1

Consider the following program having multi-level inheritance:

Note:Includes all required header files

```
class A {
public:
  void print() { cout << "In A" << endl; }
};

class B : public A {
public:
  void print() { cout << "In B" << endl; }
};

class C: public B { };
```

```
int main(void)
{
 C c;
 c.print();
 return 0;
}
```

What is the outcome of the compilation and execution of the above program?

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

- Successful compilation, but no output
- In A
- ✔ In B
- Compilation error

Q.2 What will be the output of the following program?

Note: Add all necessary header files

```
class Base
{
public:
  virtual void show() { cout<< "In Base" << endl; }
};


class Derived: public Base
{
public:
  void show() { cout<< "In Derived" << endl; }
};
```

```
int main(void)
{
   Base *bp = new Derived;
   bp->show();

   Base &br = *bp;
   br.show();

   return 0;
}
```

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

- In Base
  In Derived
- In Derived
  In Base
- ✔ In Derived
  In Derived
- In Base
  In Base

Q.1 You want to create a function by overloading the subtraction operator available in C++. Which of the following is the correct name of the function?

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

- operator(-)
- subtract
- ✔ operator-
- -

Q.2 Which of the following catch statements is used to catch any exception?

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

- catch (const char* msg)
- ✔ catch(...)
- catch()
- catch (all)

Q.1 Which of the following is/are the goal(s) of secure programming?

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

- To secure the program from getting updated by other programmers
- To ensure that the code is error-free during normal operation
- To improve the readability of the code
- ✔ To prevent the program from producing erroneous results when some attacker deliberately attempts to do so

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Q.2 Suppose you want to ensure that the value of a variable ***balance*** should never be less than 0 at some location in your code written in C++. Which one of the following is the correct assert statement to be placed at that location?

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

- assert (\(0\));
- assert (\(balance < 0\));
- assert (\(balance > 0\));
- ✔ assert (\(balance >= 0\));

Q.1 What will be the output of the following bash script?

```
a=2
b=3
c=$a+$b
echo c
```

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

- [ ] 2
- [x] c
- [ ] 5
- [ ] 3

Q.2 Which of the following commands will always produce nothing on the screen?

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

- [ ] ls -l a.txt b.txt > outfile
- [x] ls -l a.txt b.txt &> allfile
- [ ] ls -l a.txt b.txt 2> /dev/null
- [ ] ls -l a.txt b.txt 2> errfile

Q.1 Consider the following bash script with name compare.sh.

#!/bin/bash

[$1 -le $2]

echo $?

What is the output of the following commands?

chmod +x compare.sh

./compare.sh 5 5

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

- 2
- ✔ 0
- 1
- 5

Q.2 Consider the following bash script with name param.sh.

#!/bin/bash

echo $#

What is the output of the following commands?

chmod +x param.sh

./param.sh 5 8 abc

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

- ✔ 3
- 1
- 2
- 4

Q.1 What is a phony target in a makefile?

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

- [ ] The default target for the make command
- [x] A target which is not a filename
- [ ] A target which is not used with the make command
- [ ] A target which is a filename

Q.2 Suppose that you have a makefile named "makexe" that has been written to generate an exe file "shaper". Which of the following command will generate the file "shaper" successfully?

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

- [ ] make makexe
- [ ] make
- [x] make -f makexe shaper
- [ ] make makexe shaper

Q.1 Which of the following type of testing is/are not performed by the software development team?

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

- [x] Acceptance testing
- [ ] Unit testing
- [ ] System testing
- [ ] Component testing

Q.2 Consider the following function:

```
int function(int a, int b) {
....
....
return x;
}
```

Which of the following is/are test case(s) for the above function?

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

- [x] a = 0, b = 0, x = 0
- [x] a = 5, b = 10, x = 15
- [ ] a = 5
- [ ] a = 5, b = 40

Q.1 Consider the following conditional statement:

```
If ((a >0) || (b >0))
 cout << "Hello" << endl;
else
 cout << "Bye" << endl;
```

Which of the following test suites provides more than 0% decision coverage for the above conditional statement?

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

- [ ] $\langle a = 0, b = 0, \text{" } Bye \text{ "} \rangle, \langle a = 1, b = 0, \text{" } Hello \text{ "} \rangle$
- [ ] $\langle a = 0, b = 0, \text{" } Bye \text{ "} \rangle, \langle a = 1, b = 1, \text{" } Hello \text{ "} \rangle$
- [ ] $\langle a = 1, b = 0, \text{" } Hello \text{ "} \rangle, \langle a = 0, b = 1, \text{" } Hello \text{ "} \rangle$
- [ ] $\langle a = 0, b = 0, \text{" } Bye \text{ "} \rangle, \langle a = 0, b = 1, \text{" } Hello \text{ "} \rangle$

Q.2 Suppose a test suite provides compete decision/condition coverage for a given program.

The test suite also provides complete coverage for the same program for which of the following coverage criteria?

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

- ☐ Condition coverage
- ☐ Decision coverage
- ☐ Modified condition/decision coverage
- ■ Multiple condition coverage

Q.1 In the context of unit testing, mocking is used in which of the following situations?

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

- ✔ ■ The unit under test needs to respond to rare events during its operation
- ✔ ■ When an object which is part of the environment of the unit under test has not been implemented yet
- ☐ The unit under test has not been implemented yet
- ✔ ■ When an object which is part of the environment of the unit under test is computationally expensive

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Q.2 Consider the following entry in the test program to be used in a googletest framework:

```
TEST(IsPrimeTest, Positive_crit) {
 EXPECT_FALSE(IsPrime(9));
}
```

Which of the following is the names of the test case and test suite for the above entry respectively?

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

- ☐ IsPrimeTest, EXPECT_FALSE
- ☐ IsPrimeTest, Positive_crit
- ■ EXPECT_FALSE, Positive_crit
- ✔ ☐ Positive_crit, IsPrimeTest
