Sir Syed University of Engineering & Technology

Faculty of Computing & Applied Sciences

Department of ____Software Engineering___________

Online End Semester Examinations (Spring 2021)

Course Code with Title	**SE-103: Objected Oriented Programming**	**Program**	BS (Software Engineering)
Instructor	Engr. Tauseef Mubeen, Engr. Adnan Afroz, Engr. Zainab Zakir	**Semester**	2nd
Start date & Time	June 15, 2021 at 08:30 AM	**Submission Deadline**	June 15, 2021 at 1:30PM
Maximum Marks	50		
Students must meet their submission deadline as there is no re-take or re-attempt after the deadline.			

IMPORTANT INSTRUCTIONS:

Read the following Instructions carefully:

- Attempt All Questions on MS-Word. Font theme and size must be Times New Roman and 12 points respectively. Use line spacing 1.5.
- You may provide answers HANDWRITTEN. The scanned solution must be submitted in PDF file format (Use any suitable Mobile Application for Scanning)
- For Diagrams, you can use paper and share a clear visible snapshot in the same Answer Sheet.
- Arrange questions and their subsequent parts in sequence.
- Make sure that your answers are not plagiarized or copied from any other sources. In case of plagiarism, **ZERO** marks will be awarded.
- Provide relevant, original and conceptual answers, as this exam aims to test your ability to examine, explain, modify or develop concepts discussed during the course.
- Recheck your answer before the submission on **VLE** to correct any content or language related errors.
- You must upload your answers via the VLE platform ONLY.

You must follow general guideline for students before online examination and during online examination which had already shared by email and WhatsApp.

This paper has a total of _06__ pages including this title page

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Q.1. **(12)**

Each part of this question contains three statements out of which **TWO** are correct and **ONE** is wrong. You have to pick the **correct ones** and also provide **justification in 4 to 5 line with proper coding example**: (Justification in your own wording is mandatory).

I.

a. When you overload Java methods, you write multiple methods with a shared name.
b. When you overload Java methods, the methods are called using different arguments.
c. Instead of overloading methods, it is preferable to write methods with unique identifier.

II.

a. When an application contains an array, it is common to perform loops that vary the loop control variable from 0 to one less than the size of the array.
b. An array's length field contains the highest value that can be used as the array's subscript.
c. The enhanced for loop allows you to cycle through an array without specifying the starting and ending points for the loop control variable.

III.

a. To create a String object, you must use the keyword new and explicitly call the class constructor
b. When you compare Strings with the == operator, you are comparing their memory addresses, not their values.
c. When you compare Strings with the equals () method, you are comparing their values, not their memory addresses

IV.

a. You use the keyword inherits to achieve inheritance in Java.
b. A derived class can access directly all its parents' nonprivate methods.
c. Subclasses are more specific than the superclass they extend

V.

a. Abstract classes usually have one or more empty abstract methods
b. An abstract class is one from which you cannot inherit, but from which you can create concrete objects
c. An abstract method has no body, curly braces, or statements

VI.

a. You can use the keyword super from within a derived class method to access a base class method that has not been overridden. constructs, and it cannot have a return type.
b. You can use the keyword this from within a derived class method to access an overridden base class method.
c. You can use the keyword super from within a derived class method to access an overridden base class method

Rollo mod 3=0	Pick the correct options and provide justification in I and II
Rollo mod 3=1	Pick the correct options and provide justification in III and IV
Rollo mod 3=2	Pick the correct options and provide justification in V and VI

Suppose Student **Rollo is=99mod 3=0** attempt to pick the correct options in I and II.

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Q.2. **(15)**

The ABC Co. initiates insurance of up to Rs.50,00000 for various insurance plans. They divide their insurance plans into 7 categories i.e. **BusinessInsurance, PersonalInsurance, HealthInsurance, CarInsurance, EducationInsurance, PropertyInsurance and LifeInsurance.**

Write an application that controls all types of insurance plans. The application must also calculate the total amount owed at the due date (**original insurance amount + premium fee**). The application should include the following classes:

- **Insurance**—A **public abstract class Insurance** that implements the **FixedInsurance interface**. This Insurance class includes a **policynumber, customerfullname, insurance amount, interestrate, and timeperiod**. The constructor requires data for each of the fields except interest rate. Do not allow insurance amount more than **Rs.50,00000**. Force any insurance timeperiod that is not one of the three defined in the **FixedInsurance interface** to a (**beginner= 5 year insurance), (intermediate= 10 years insurance, and (advance =20 years) insurance.**. Create a **toString()** method that displays all the insurance data. There is an abstract method **annuallyPaymentPlan()** that can calculate the annual amount to pay on **annual** basis after applying the interest rate.

- **FixedInsurance interface** —A public interface class. **FixedInsurance interface** includes constant values (**beginner= 5 year insurance), (intermediate= 10 years insurance),** and **and (advance =20 years) insurance**. It also contains final variable **company name** and the maximum **insurance amount**.
- **PersonalInsurance**—A public class that extends **Insurance**. The PersonalInsurance constructor sets the interest rate to **4% per year** over the current prime interest rate. It will be allocated for 5 years. There is also a **String variable Type** mentioning type of Insurance.

- **PropertyInsurance**- A public class that extends **Insurance**. The PropertyInsurance constructor sets the interest rate to **7 % per year** over the current prime interest rate. It will be allocated for 10 years. There is also a **String variable Type** mentioning type of Insurance

- **LifeInsurance:** A public class that extends **Insurance**. The LifeInsurance constructor sets the interest rate to **8 % per year** over the current prime interest rate. It will be allocated for 20 years. There is also a **String variable Type** mentioning type of Insurance.

- **EducationInsurance:** A public class that extends Loan. The EducationLoan constructor sets the interest rate to **1.5 % per year** over the current prime interest rate. It will be allocated for 15 years. There is also a **String variable Type** mentioning type of Insurance.

- **CarInsurance:** A public class that extends Insurance. The CarInsurance constructor sets the interest rate to **5 % per year** over the current prime interest rate. It will be allocated for 7 years. There is also a **String variable Type** mentioning type of Insurance
- **BusinessInsurance** —A public class that extends Insurance. The BusinessInsurance constructor sets the interest rate to **1 % per year** over the current prime interest rate. It will be allocated for 20 years. There is also a **String variable Type** mentioning type of Insurance
- **HealthInsurance**: —A public class that extends Insurance. The HealthInsurance constructor sets the interest rate to **7 % per year** over the current prime interest rate. It will be allocated for 8 years. There is also a **String variable Type** mentioning type of Insurance

An application that allows students to implement the scenario depending on the basis of choice rule **mentioned above**. Prompt the user for the **current prime interest rate** and display and all relevant information for that loan including method of **annuallyPaymentPlan().**

Roll mod 7=0	**Implements Insurance, FixedInsurance and CarInsurance**
Roll mod 7=1	**Implements Insurance, FixedInsurance and Education Insurance**
Roll mod 7=2	**Implements Insurance, FixedInsurance and LifeInsurance**
Roll mod 7=3	**Implements Insurance, FixedInsurance and PropertyInsurance**
Roll mod 7=4	**Implements Insurance, FixedInsurance and BussinessInsurance**
Roll mod 7=5	**Implements Insurance, FixedInsurance and HealthInsurance**
Roll mod 7=6	**Implements Insurance, FixedInsurance and PersonalInsurance**

Suppose your Rollno is 348 mod 7=5 so you have to attempt Insurance, FixedInsurance and HealthInsurance.

Q.3. **(13)**

Logical portion

Suppose that statement2 causes an exception in the following statement:

```
1   try {
2         statement1;
3         statement2;
4         statement3;
5      }
6   Catch (Exception ex1)
7    {
8               }
9
10  catch (Exception2 ex2)
11  {
12    throw ex2;
13              }
14  catch (Exception3 ex3)
15  {
16              }
17  finally {
18         statement4;
                }
    statement5;
```

Answer the following questions:
If an exception occurs, will **statement4** be executed, and will **statement5** be executed? **Demonstrate** your answer by taking appropriate example.

a. What will happen if finally, block is placed at line no 6 in place of catch block. Justify your answer with proper reasoning.
b. What will be the output the above mentioned code if we comment out the code from **line 6** to **line 16.**
c. What you predicts if **line 8** is replaced by catch (Exception e) and why. Give proper **demonstration** of it.
d. What you predicts the behavior of the code if catch (Exception e) is added at **line 18** . Give proper **demonstration** of it

Programming portion

A program of Calculator class that can perform division, multiplication, subtraction of two numbers and the square root of the number. Calculator class contains default and overloaded constructor for initialization of variables. There is a separate method of division, multiplication, subtraction and square root that perform desire operation.

i. In Division if second number is equal to zero, method throws Arithmetic Exception and print message “answer cannot exist”. Create main class that display one normal execution of division and one with exception case.
ii. In subtraction if the value of second number is greater than first number method throws IllegalArgumentException and print message “answer is negative”. Create main class that display one normal execution of subtraction and one with exception case.
iii. In square root if the value of number is negative throws IllegalArgumentException and of print message “square root is not possible”. Create main class that display one normal execution of squareroot and one with exception case.
iv. In Multiplication if the value of first or second number is zero throws IllegalArgumentException and print message “answer is zero”. Create main class that display one normal execution of multiplication and one with exception case.

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Students should have to answer an one logical portion and one programming portion depending upon the logic, Rollno is 125 the 125 mod 4=1 attempt Logical question(b) programming portion(iii)

Roll mod 4=0	**Logical question(a) and programming portion(iv)**
Roll mod 4=1	**Logical question(b)and programming portion(iii)**
Roll mod 4=2	**Logical question(c)and programming portion(i)**
Roll mod 4=3	**Logical question(d) and programming portion(ii)**

Q.4. **(10)**

The b**_name, b_writers, b_printer, b_barcode, b_cost**, and b**_publicationyear** are parameters of a book. Create the **Book** class, which defines the book a new datatype. The Book object hold the above-mentioned book parameters information**: b_name, b_printer, b_barcode, b_ cost, b_publicationyear, b_copiesavailable, and b_writers it can store information up to 4 writers.** Add the necessary constructors.

The methods related to Books are divided into three categories i.e. (a) by b_name, (b)by b_ availability(c)by b_printer.

a. Include the methods to perform various operations on the objects of Book. For example, the usual operations that can be performed on the b_name are to show the b**_name**, **set the b_name**, **get the b_name**, **set and get method for b_publicationyear**. Write a program that uses the class Book and tests various operations on the objects of class Book by calling above mentioned setter and getter methods related to b**_name** of Book.

b. Similarly, the typical operations that can be performed on the number of copies in stock are to show the b**_copiesavailable**, **set the b_copiesavailable, update the b_copiesavailable**, and **return the number of b_copiesavailable**. Include the above methods to the perform the various operations on b_availability. Write a program that uses the class Book and tests various operations on the objects by calling above mentioned setter and getter methods related to **b_availability** of Book.

c. The methods related to the b_printer is**, b_barcode, b_cost, and b_writers**. **Set the b_barcode, get the b_barcode, set b_cost, getb_cost, set b_writers, get b_writers**. Add the appropriate constructors. Create appropriate setter and get methods of above-mentioned parameters related to b_printer that are bold. Write a program that uses the class Book and tests various operations on the objects of class by calling above mentioned setter and getter methods related to b_printer of Book.

Rollno mod 3=0	**Create Book class and provide implementation of methods related to b_name in (a)**
Rollno mod 3=1	**Create Book class and provide implementation of methods related to b_printer in (c)**
Rollno mod 3=2	**Create Book class and provide implementation of methods related to b_avaliability in (b)**

Rollno is 125 the 125 mod 3=2 Create Book class and provide implementation of methods related to Publisher in (c)