**Centennial College**

**COMP 228: Java Programming**

**Hands-on Midterm Test**

**Student:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Be sure to read the following general instructions carefully:**

* **This lab test must be completed individually by all the students.**
* **Save your program periodically just in case that your PC crashes.**

YOU NEED TO SUBMIT THE FOLLOWING 2 DOCUMENTS IN THE DROPBOX TITLED MidTermTest:

1. THE FIRST ONE IS A WORD DOCUMENT. USE THIS DOCUMENT AND ADD SCREEN SHOTS OF THE RUNNING STATE OF THE APPLICATION. DO NOT DELETE THE QUESTIONS. THE SCREEN SHOTS SHOULD COVER ALL THE ASPECTS/FUNCTIONALITIES OF THE APPLICATION. AFTER THE SCREEN SHOTS PLEASE COPY THE CODE FROM THE CODE WINDOW AND PASTE THE COMPLETE CODE INTO THE SAME WORD DOCUMENT. DO NOT GIVE ME SCREEN SHOTS OF THE CODE. DO NOT ZIP THIS FILE AND KEEP IT SEPARATE FROM YOUR ZIPPED PROGAM FILE.

2. SUBMIT ALSO ONE ZIPPED PROJECT/PROGRAM FILE THAT CONTAINS THE PROJECT IN ITS ENTIRITY SEPARATELY INTO THE SAME DROP BOX.

You must name your Eclipse/IntelliJ project and your Word file according to the following rule:

YourFullName\_COMP228MidLabTest

Example: JohSmith\_COMP228MidLabTest

Apply the naming conventions for variables, methods, classes, and packages:

- variable names start with a lowercase character

- classes start with an uppercase character

- packages use only lowercase characters

- methods start with a lowercase character

##### Exercise 1

Create an abstract class called *Book*. The class should declare the following variables:

* an instance variable that describes the *title* - String
* an instance variable that describes the *ISBN* - String
* an instance variable that describes the *publisher* - String
* an instance variable that describes the *price* - double
* an instance variable that describes the *year – integer*

Provide a toString() method that returns the information stored in the above variables.

Create the **getter** and **setter** methods for each instance variable except *price*. Provide the necessary constructors. Include *an* ***abstract*** *method* ***setPrice(double price)*** *to determine the price* for a book. Include an abstract method **getGenre()** to return the genre of the book.

Create two subclasses called *ScienceBook* and *ChildrenBook*.

Book

ChildrenBook

ScienceBook

These subclasses should override the abstract methods *setPrice* and *getGenre* of class *Book*.

Use the following rule for setting the price for a book:

* + science books will have a 10% discount per each book
  + children books will have a fixed price (specified by user).

Write a driver program (another class with **main** method) that uses the above hierarchy. In your driver program you must implement an interaction with the user.

* Use showInputDialog method to let the user input book information.
* Use showMessageDialog method to display book information including price and type for both science and children’s books.

**Evaluation:**

|  |  |
| --- | --- |
| **Functionality** |  |
| Correct implementation of classes (instance variable declarations, constructors, getter and setter methods, etc.)  Correct implementation of Inheritance/Polymorphism | 30%  20% |
| Correct implementation of driver classes (declaring and creating objects, calling their methods, interacting with user, displaying results) | 35% |
| Comments, correct naming of variables, methods, classes, etc. | 5% |
| **Friendly input/output** | 10% |
| **Total** | 100% |

**SCREENSHOTS:**

**OUTPUTS:**

**A screenshot of a computer

Description automatically generated**

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generatedentering the price here that is 100 for the science book

A screenshot of a computer

Description automatically generated

Running state of the science book with the shown discount as the price entered was 100 as shown in the above screenshot-

A screenshot of a computer

Description automatically generated

Running state of the children book with fixed price –

A screenshot of a computer

Description automatically generated

CODE –

BOOK class –

**package** exercise1;

**import** javax.swing.JOptionPane;

**abstract** **class** Book {

**protected** String title;

**protected** String ISBN;

**protected** String publisher;

**protected** **double** price;

**protected** **int** year;

**public** Book (String title, String ISBN, String publisher, **int** year) {

**this**.title = title;

**this**.ISBN = ISBN;

**this**.publisher = publisher;

**this**.year = year;

}

**public** **abstract** **void** setPrice(**double** price);

**public** **abstract** String getGenre();

**public** String getTitle() {

**return** title;

}

**public** **void** setTitle(String title) {

**this**.title = title;

}

**public** String getISBN() {

**return** ISBN;

}

**public** **void** setISBN(String ISBN) {

**this**.ISBN = ISBN;

}

**public** String getPublisher() {

**return** publisher;

}

**public** **void** setPublisher(String publisher) {

**this**.publisher = publisher;

}

**public** **int** getYear() {

**return** year;

}

**public** **void** setYear(**int** year) {

**this**.year = year;

}

**public** String toString() {

**return** "Title: " + title + "\nISBN: " + ISBN + "\nPublisher: " + publisher + "\nPrice: $" + price + "\nYear: " + year;

}

}

SCIENCEBOOK CLASS a subclass of the book class –

**package** exercise1;

**import** javax.swing.JOptionPane;

**class** ScienceBook **extends** Book {

**public** ScienceBook(String title, String ISBN, String publisher, **int** year) {

**super**(title, ISBN, publisher, year);

}

**public** **void** setPrice(**double** price) {

**this**.price = price \* 0.9; // 10% discount for science books

}

**public** String getGenre() {

**return** "Science";

}

}

Childrenbook class also a subclass of book –

**package** exercise1;

**public** **class** ChildrenBook **extends** Book {

**public** ChildrenBook(String title, String ISBN , String publisher , **int** year ) {

**super** ( title , ISBN , publisher , year);

}

// fixed price

**public** **void** setPrice(**double** price) {

**this**.price = price;

}

**public** String getGenre() {

**return** "Children";

}

}

Main class –

**package** exercise1;

**import** javax.swing.JOptionPane;

**public** **class** Main {

**public** **static** **void** main(String[] args) {

// For science book information

String scienceTitle = JOptionPane.*showInputDialog*(**null**, "Enter science book title:");

String scienceISBN = JOptionPane.*showInputDialog*(**null**, "Enter science book ISBN:");

String sciencePublisher = JOptionPane.*showInputDialog*(**null**, "Enter science book publisher:");

**int** scienceYear = Integer.*parseInt*(JOptionPane.*showInputDialog*(**null**, "Enter science book year:"));

**double** sciencePrice = Double.*parseDouble*(JOptionPane.*showInputDialog*(**null**, "Enter science book price:"));

ScienceBook scienceBook = **new** ScienceBook(scienceTitle, scienceISBN, sciencePublisher, scienceYear);

scienceBook.setPrice(sciencePrice);

//For children book information

String childrenTitle = JOptionPane.*showInputDialog*(**null**, "Enter children book title:");

String childrenISBN = JOptionPane.*showInputDialog*(**null**, "Enter children book ISBN:");

String childrenPublisher = JOptionPane.*showInputDialog*(**null**, "Enter children book publisher:");

**int** childrenYear = Integer.*parseInt*(JOptionPane.*showInputDialog*(**null**, "Enter children book year:"));

**double** childrenPrice = Double.*parseDouble*(JOptionPane.*showInputDialog*(**null**, "Enter children book price:"));

// Creating childrenBook object

ChildrenBook childrenBook = **new** ChildrenBook(childrenTitle, childrenISBN, childrenPublisher, childrenYear);

childrenBook.setPrice(childrenPrice);

// Display book information

String scienceBookInfo = "Science Book:\n" + scienceBook.toString() + "\nGenre: " + scienceBook.getGenre();

JOptionPane.*showMessageDialog*(**null**, scienceBookInfo);

String childrenBookInfo = "Children Book:\n" + childrenBook.toString() + "\nGenre: " + childrenBook.getGenre();

JOptionPane.*showMessageDialog*(**null**, childrenBookInfo);

}

}