KISII UNIVERSITY

UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF THE

DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE
FIRST SEMESTER, 2023/2024
(AUGUST-DECEMBER, 2023)

COMP 305/SOEN 305/BIT 335: OBJECT ORIENTED PROGRAMMING II [JAVA]

STREAM: Y3 S1   **TIME: 2 HOURS**

DAY: THURSDAY, 03:00–05:00 PM   **DATE: 28/11/2023**

INSTRUCTIONS

1. *Do not write anything on this question paper.*
2. *Answer Question ONE [Compulsory] and any other TWO Questions.*

QUESTION ONE [30 marks]

(a) Consider the following code and answer the questions:

```
package com.example.test;

public class Address {
    public String city;
    public int postCode;
}
```

```
package com.example.test1;

public class Student extends Person{
    public  void print(){
        // prints the value of name, age, address
    }
}
```

```
package com.example.test;

public class Person{
    private String name;
    private int age;
    private Address address;

    Person(){
        name = "Tamim Iqbal";
        age = 35;
        address = new Address();
        address.postCode = 1200;
        address.city = "Dhaka";
    }
}
```

Activate Windows

    i. Suggest two modifications in the Person class so that the class variables can be accessible from the Student class. You are not allowed to use the public keyword for the variables. [2 marks]

   ii. Add the necessary code lines in the Student class so that it can access variables in Address and Person class. [4 marks]

(b) What is a java exception? List the keywords associated with exceptions in Java, giving a one sentence description of what each one is for. [4 Marks]

(c) Consider the following class definition:

```
abstract class date {
        private int day; // from 1 to 31
        private int month; // from 1 to 12
        private int year; // from 2000 upwards
        public void advance[]; // move to next day
}
```

   (i)   Implement a constructor that initializes new objects of date class to be set to the 1st of January 2000. [5 marks]

   (ii)   Implement setters for day, month and year. [5 marks]

(d) Given an abstract method below answer the questions that follow if the area of a triangle is calculated with the formula ½*b*h

public abstract int getArea[];

Write a class Triangle that overrides getArea if the abstract method getArea is declared in Shape which is a superclass of Triangle [5 marks]

(e) Write the steps to set the JDBC connectivity with backend database [5 marks]

QUESTION TWO [20 marks]

(a) Discuss the member accessibility modifiers of Java [3 marks]

(b) What is an exception? Write a Java program to handle user defined exception.[6 marks]

(c) Define interface. How does the interface differ from class? Explain with example.[6 marks]

(d) Define an abstract method and describe the circumstances in which the use of an abstract method would be appropriate. [5 marks]

QUESTION THREE [20 marks]

(a) Give three differences between a java application and an applet [3 marks]

(b) In not more than 4 lines, discuss the relationship between the awt and swing packages [3 marks]

(c) Write a java applet that draws the diagram below [9 marks]

(d) Write an html file that loads the applet in c] above [3 marks]

(e) If one doesn't have a web browser installed, how can he run the applet in c above?[2 marks]

QUESTION FOUR [20 marks]

Suppose your brother owns an online shop and recently he decided to give discounts on some of the items in the shop. Different items can have different discounts, i.e 5% discount, 10% discount etc. Now, your brother has sold some discounted items [let's say 5 items]. Now he wants your help in finding the total sales value of the items sold.

To help you with the task, the Item class and the DiscountedItem class [partial] is provided below.

```
class Item {
    String name;
    double price;

    public double getPrice() {
        return price;
    }
}

class Shop{
    public static void main(String[] args) {
        Item[] items = new Item[5];

        // Code 2: Initialize itmes array and
        // calculate the total price
    }
}
```

```
class DiscountedItem extends Item{
    double discount;

    DiscountedItem(String name, double price,
                        double discount){
        this.name = name;
        this.price = price;
        this.discount = discount;
    }

    public double getPrice() {
        // Code 1: Calculate and return
        // the discounted price
    }
}
```

You will need to:

(a) Complete the DiscountedItem class by writing the code inside the getPrice method. The getPrice method in the DiscountedItem class should calculate and return the discounted price using price and discount instance variables.   [10 marks]

(b) Initialize the array items in the main method. The array should contain DiscountedItem objects. After that, use the array to calculate the total sales value.   [10 marks]
[Note: You can only write the necessary codes, with heading Code 1 & Code 2]

QUESTION FIVE [20 marks]

a) After receiving the form 4 KCSE results, the school principal wants to store them in a file. Each student has a name, registration number, year of birth and biology mark. Use streams to answer the following questions.DO NOT USE Scanner class.

    i. Write a java program that accepts the student details and saves his/her name, registration number, date of birth and mark into a file [results.txt].
[8 marks]

    ii. Write a method that reads from the file and then prints the results in a tabular format changing output to capital letters   [5 marks]

b) What is thread? Write a Java program to implement multi-threading.   [7 marks]