(Knowledge for Development)

KIBABII UNIVERSITY

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UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR

SPECIAL/SUPPLEMENTARY EXAMINATIONS
YEAR TWO SEMESTER ONE EXAMINATIONS

FOR THE DEGREE OF
BACHELORS OF SCIENCE
(COMPUTER SCIENCE)

COURSE CODE: CSC 210

COURSE TITLE: OBJECT ORIENTED PROGRAMMING II

DATE: 16/02/2021   **TIME:** 02.00 P.M – 04.00 P.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

a. Explain briefly the three striking features of object oriented programming paradigms.

[3 marks]

b. Using relevant signatures differentiate between get/accessor method and set/mutator

methods.   [4 marks]

c. A class is defined as

```
1  public class Time
2  {
3    private  int hour;
4    private  int min;
5    private   int sec;
6  }
```

  i. Write definition of appropriate set methods such that their calls can be used.

[3 marks]

  ii. Write a line of code that will successfully pass on calls to methods defined in (i) in a

  single statement. Pass dummy parameters to each method.

  [2 marks]

  iii.Using String stream object, write definition of a toString() method such that it returns a

  String of the current time in the form hour:min:sec.   [2 marks]

d. Which of the following Java statements set even true if n is even, and to false if n is odd? (n

is an integer.) Assume n>= 0. Give a brief explanation.   [2 marks]

```
I.    boolean even = (n/2.0 == (double)(n/2));
II.   boolean even = (n % 2 == 0);
III.  boolean even = (n div 2 == 0);
IV.   boolean even = (n % 2 == n/2);
```

e. Consider the program; comments indicate where missing needed components of the program

are to be placed.

```
public class MainClass
{
//definition of a function that prints out a greeting
public static void main(String[] args)
{
//(2) print the greeting
//(3) construct a MyClass object called myObject
//(4) update myObject
//   print myObject
}
}
```

```
public class MyClass
{
// (1) definition of MyClass constructor
public static void greetings()
{
// definition of greets
}
public void update(int num, String title)
{
// definition of update
}
public void print()
{
// definition of print
}
private int numOfItems;
private String reportTitle;
}
```

i. Suppose you are writing the definition of MyClass (line (1) above). Which of the following

method signatures (headers) is correct? **[2 marks]**

A. *public MyClass*
B. *public MyClass()*
C. *public void MyClass*

D. *public void MyClass()*
E. *public MyClass(void)*

ii. Suppose you wish to call the method that prints the greeting, at line(2) above. Which of the

following statements will call this method correctly? myObject is the MyClass object defined in

the question above. **[2 marks]**

A. *MainClass.greetings();*
B. *myObject.greetings();*
C. *MyClass.greetings();*

D. *void result = greetings();*
E. *greetings();*

iii. Suppose you wish to construct a MyClass object called myObject at line (3) above. Which of
the following statements will correctly do this? **[2 marks]**

A. *MyClass myObject;*
B. *myObject.MyClass();*
C. *MyClass myObject = MyClass();*

D. *MyClass myObject = new(MyClass);*
E. *MyClass myObject = new MyClass();*

iv. Suppose you wish to call the **update** method at line(4) above. Which of the following
statements will call this method correctly? **[2 marks]**

A. *update(myObject(3, "Hi!"));*
B. *update(3, "Hi!");*
C. *MyClass.myObject.update(3, "Hi!");*

D. *myObject.update(3, "Hi!");*
E. *MyClass.update(3, "Hi!");*

f.   i. Where do we register events: on a JMenu, JMenuItem or both. Explain.   **[3 marks]**

     ii. Explain what the following code achieves.   **[2 marks]**

> **JButton ear=new JButton ("Save);**
>
> **ear.addActionListener(e -> System.Exit(0));**

g. You are given the following elements in a computer memory

45	56	76	66	87
51	89	65	90	43
37	72	63	43	80

Using a relevant array name, write a java code that will create and initialize these elements.

[3 marks]

QUESTION TWO   [20 MARKS]

a. i. Explain the relationship between an actionEvent object and an actionListener interface.

[2 marks]

ii. How can one create a class named Login that is both a JFrame and ActionListener type? Illustrate with a java code segment.   **[2 marks]**

a. A student wanted to add three Buttons and Panel object on a JFrame. He resorted in using FlowLayout manager in arranging the buttons objects on the Panel then BorderLayout in adding the Panel object on the North of a JFrame.

  i. Write a java code that will create and initialize Button objects as "Save", "Reset" and "Exit", the Panel object and the Jframe.   **[2 marks]**

  ii. Write java code that will be used to add the created objects in **(i)** above on the JFrame object.   **[4 marks]**

b. Write java code extract to demonstrate the parameters of :   **[4 marks]**

  i. Message dialog box

  ii. Input dialog box

c. The volume (V) of a cylinder is given by $\pi r^2 h$ where (π) is pie which is constant, (r) is radius of the cylinder and (h) is the height or depth of the cylinder. Write a program that takes the values of r, h as inputs and value of PI from Math class compute and display the volume (V) as an output. Use the JoptionPane for both inputs and output routine. **[6 marks]**

QUESTION THREE   [20 MARKS]

a. Create a class called Invoice that a hardware store might use to represent an invoice for an item sold at the store.

i.   An Invoice should include four pieces of information as instance variables- a part number (type String), a part description (type String), a quantity of the item being purchased (type int) and a price per item (double). **[2 marks]**

ii. Your class should have a constructor that initializes the four instance variables. **[2 marks]**

iii. Provide a set and a get method for each instance variable. In addition, provide a method named getInvoice Amount that calculates the invoice amount (i.e., multiplies the quantity by the price per item), then returns the amount as a double value. If the quantity is not positive, it should be set to 0. If the price per item is not positive, it should be set to 0.0. **[4 marks]**

iv. Write a test application named InvoiceTest that demonstrates class Invoice's capabilities. **[3 marks]**

a. A class hierarchy is defined as

```
1   public class Person {
2   private string name;
3   public final  void howToMove( )
4   {
5   System.out.println(" Walking");
6   }
7   }
    class Student  extends Person {
8   public void howToMove( ) { System.out.println(" Skiing \n");}
9   public  Student( ) {  }
10  }
```

Explain TWO errors in the code above. **[2 marks]**

b. A class is declared as

```
1   class Employee {
2   private  String firstname;
3     private  String lastname;
      private  String pfnumber;
4     public  final double earning( ) { return 0.0; }
      public final double getSalary( ) {return 0.0;  }
5   }
```

i.   Write definition of Class SalariedEmployee who earns a monthly salary such that it implements the method earning ( ) in Employee. SalariedEmployee earns 85% of their monthly salary and pay 15% as TAX. **[3 marks]**

ii. Assuming a salaried employee salary is set to 10000.00, what would be the output of the code below if getSalary( ) and earning( ) have identical implementation in SalariedEmployee? Explain your answer. **[3 marks]**

```
Employee  e= new Employee( );
Employee ee= new Employee( );
SalariedEmployee se=new SalariedEmployee( );
e = se;
System.out.println(e.earning( ) );
System.out.println(e.getSalary( ));
System.out.println(ee.earning( ));
```

QUESTION FOUR   [20 MARKS]

a. i. A store owner wants to create a website that displays all items in the store. Each item has a name, a price and is organized by department. It would be in the store owner's best interest to create an interface for what defines an item. This will serve as the blueprints for all items in the store, requiring all items to at least have the defined qualities above. Define a java interface for this scenario. **[4 marks]**

ii. The owner adds a new item to his store named cookie: Each costs 100 KES, Cookies can be found in the Bakery department and each cookie is identified by a type. Create a Cookie class that implements the Item interface, adding methods or fields that are specific to cookies. **[4 marks]**

b. A student is a person who has registration number and a programme of study in addition to Personal attributes. A **Person** has name, gender and date of birth. A person **Name** consists of first name and last name, both as Strings. A **Date** is made up of day, month and year.

   i. Write the definition of the class **Date**.   **[3 marks]**

   ii. Write the definition of the class **Name**.   **[3 marks]**

   iii. Write the definition of the class **Person**.   **[3 marks]**

   iv. Write the definition of the class **Student**.   **[3 marks]**

QUESTION FIVE   [20 MARKS

a. Why do we require packages and import statements in java?   **[1 marks]**

b. For a programmer to key in inputs from the keyboard, Scanner class is required. Import statement is used to import java.utl.Scanner at the start of program file.

i. Write a java statement that will be used in the main method to create and initialize a Scanner object. **[2 marks]**

ii. Write a java code that will be used to capture an integer, a double and a String input value from the keyboard. **[3 marks]**

c. A week has got seven days. The day are numbered from 1-7. Each day has a name with day 1 being Sunday and day 7 corresponding to Saturday. The names of the days are stored in a private static array **names** whose structure in memory is shown in Figure 1.

Names →

Sun	Mon	Tue	Wed	Thu	Fri	Sat

Figure 1: Structure of an array in memory

i. Write a line of code that initializes the array **names** with names shown in Figure 1 such that is accessible to all object of the class **Week**. **[3 marks]**

ii. Write a method definition that will initialize a day of the week. Day is initialized to a number between 1 and 7. **[3 marks]**

iii. Write a method definition that returns the number of current day of the week. **[2 marks]**

iv. Write a method definition that returns the name that corresponds to the current day of the week. If current day is 1, this method returns **Sun**. [Don't use decision statements]. **[2 marks]**

v. Write a method definition that returns the name of the next day. **[2 marks]**

vi. Write a method or a function definition that returns the name of the previous day. [Use decision making constructs sparingly]. **[2 marks]**