(Knowledge for Development)

KIBABII UNIVERSITY

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MAIN CAMPUS

UNIVERSITY EXAMINATIONS

SPECIAL/SUPPLEMENTARY EXAMINATION

2021/2022 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER EXAMINATION

FOR THE DEGREE OF BACHELORS OF SCIENCE IN

(INFORMATION TECHNOLOGY/ COMPUTER SCIENCE)

COURSE CODE: BIT 211/CSC 210

COURSE TITLE: OBJECT ORIENTED PROGRAMMING II

DATE: 15/07/2022 **TIME: 2.00 P.M. – 4.00 P.M.** **2HRS**

INSTRUCTIONS TO CANDIDATES:

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

Paper Consists of 5 Printed Pages. Please Turn Over

QUESTION ONE (COMPULSORY) [30 MARKS]

a. Using relevant examples, define the following terms and concepts as used in study of OOP.

i Interface [2 marks]

ii Abstract class [2 marks]

b. Explain how the process of initialization and cleanup services is managed in java. [3 marks]

c. Explain what will happen if the statements below are executed: [2 marks]

```
int x = 123_456_789;
double num = 9_423_497.1_0_9;
```

d. The keyword '**abstract**' can be used for methods as well as classes in java. Explain the two different uses. Give an example in each. [4 marks]

e. Consider the program below.

```
class ArrayDemo{
{
public static void main (String args []){
int twoD[][]= new int [4][];
twoD[0]= new int [1];
twoD[1]= new int [2];
twoD[2]= new int [3];
twoD[3]= new int [4];
int I, j, k=0;
for(i=0; i<4; i++)
for(j=0; j<i+1; j++){
twoD[i][j]=k;
k++;
}
for(i=0; i<4; i++){
for(j=0; j<i+1; j++)
System.out.print(twoD[i][j]+"");
System.out.println();
}
}
}
```

Simulate the out of this program. [2 marks]

f. Consider the definition of the classes below.

```
final class A {
final void display()  { System.out.println("my method"); }
}
class  B extends A {
void display ()       {System.out.println("I am printing");  }
}
```

Identify errors in the above code extract. [2 marks]

g. Explain the meaning of the following concepts as used in the Graphical User Interface.

i Event driven programming? **[2 marks]**

ii Event delegation **[2 marks]**

h. Create a class to represent a Sphere. Your class should contain instance variables for the radius, a parameterized constructor, set and get methods for the radius, as well as member method to calculate the area of the Sphere. Include in your class the method toString that returns the String "Sphere object" when called. **[6 marks]**

i. What are the different ways to handle exceptions? Explain **[2 marks]**

QUESTION TWO **[20 MARKS]**

a. i. What is the meaning of a generic class? **[2 marks]**

ii. Define a generic class Volume having instance variable volume of generic type. Include a method to setVolume and getVolume. **[3 marks]**

iii. Write a code extract that will create and instantiate two objects of type Volume and pass volume as "High" and 60 respectively. **[3 marks]**

b. Figure 1 shows the structure of an array named marks in memory

45	78	72	71	57	70	58	80
34	56	76	24	54	75	49	64
60	64	65	42	63	73	80	67

Figure 1: Structure of an array in memory

c. Write a java code excerpt that will:

i Create and initialize the structure as in figure 2 above. **[3 marks]**

ii Compute Total and mean of each row and populate as new two columns on right-hand-side of the structure. **[4 marks]**

iii Sort the marks in ascending order. (Hint use the sort () method of function) **[3 marks]**

QUESTIONTHREE **[20 MARKS]**

a. Differentiate between inheritance and composition. **[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]**

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. Write a program that takes the values of r, as input 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 FOUR [20 MARKS]

a. Explain the meaning of the following terms and concepts as used in oop.

i Data abstraction **[2 marks]**

ii Polymorphism **[2 marks]**

iii Late binding **[2 marks]**

b. 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 4.

Names →	Sun	Mon	Tue	Wed	Thu	Fri	Sat

Figure 4: Structure of an array in memory

i Write a line of code that initializes the array **names** with names shown in Figure 4 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. **[2 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 thecurrent 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 definition that returns the name of the previous day. [Use decision making constructs sparingly]. **[3 marks]**

QUESTION FIVE [20 MARKS]

a. Explain things that be added to a class to make it immutable. **[2 marks]**

b. Create a class called Car. The Car class has the following fields and methods: int speed; double regularPrice; String color; double getSalePrice(); **[3 marks]**

c. Create a sub class of Car class and name it as Truck. The Truck class has the following fields and methods: int weight; double getSalePrice(); such that If weight>2000,10% discount.Otherwise,20%discount. **[3 marks]**

d. Create a subclass of Car class and name it as Ford. The Ford class has the following fields

and methods: year (int); anufacturerDiscount(int); getSalePrice():double; **[3 marks]**

e. Create a subclass of Car class and name it as Sedan. The Sedan class has the following fields and methods.int length; double getSalePrice(); **[3 marks]**

f. Create MyOwnAutoShop class which contains the main() method. Perform the following within the main() method.

i. Create an instance of Sedan class and initialize all the fields with appropriate values. **[1 mark]**

ii. Use super (...) method in the constructor for initializing the fields of the superclass. **[1 mark]**

iii. Create two instances of the Ford class and initialize all the fields with appropriate values. **[1 mark]**

iv. Use super (...) method in the constructor for initializing the fields of the super class. **[1 mark]**

v. Create an instance of Car class and initialize all the fields with appropriate values. **[1 mark]**

vi. Display the sale prices of all instance. **[1 mark]**