INTI International University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session	:	**AUGUST 2017**
Programme	:	Diploma In Information And Communication Technology (DICTN)
Course	:	**ICT2100: Object Oriented Programming**
Date of Examination	:	13 December, 2017 (Wednesday)
Time	:	11:00 am – 1:00 pm Reading Time : Nil
Duration	:	2 Hours

Special Instructions :

Answer any **ALL** the questions in the answer booklet provided.

Materials permitted :

Non-programmable Calculator

Materials provided :

Nil

Examiner(s)	:	**Lai Kim Min** and Siti Hajar
Moderator	:	Ms. Siti Hawa Mohamed Said

This paper consists of 7 printed pages, including the cover page

DIPLOMA IN INFORMATION AND COMMUNICATIONS TECHNOLOGY PROGRAMME
(DICTN)
ICT2100: OBJECT-ORIENTED PROGRAMMING
FINAL EXAMINATION: AUGUST 2017 SESSION

Instruction: This paper consists of **SEVEN (7)** questions. **Answer ALL** questions in the answer booklet provided.

SECTION A: (40 marks)

Question 1

(a) Briefly explain the difference between a local variable and an instance variable? (4 marks)

(b) Suppose a, b, and c are int variables and a = 5 and b = 6. What value is assigned to each variable after each statement executes?

```
a = (b++) + 3;
c = 2 * a + (++b);
b = 2 * (++c) - (a++);
```

(3 marks)

(c) Based on the given variable, trace the value for the following expressions:

```
String str;
str = "The whole world is using Java!";
```

(i) str.substring(4, 16)

(ii) str.indexOf("world");

(iii) str.charAt(25);

(3 marks)

Question 2

(a) Give **TWO (2)** examples of Java wrapper classes. What is the purpose of Java wrapper classes? (4 marks)

(b) Create a Java class named `Game` with instance variables `title` and `yearPublished`. Add a non-default constructor and copy constructor to initialize the object.

(6 marks)

Question 3

(a) Trace the output for the following code segment:

```
int i = 1;
do {
    int num = 1;
    for (int j = 1; j <= i; j++) {
        System.out.print(num + "A");
        num += 2;
    }

    System.out.println();
    i++;
  } while (i <= 4);
```

(4 marks)

(b) Consider the following code segments:

```
class Customer {
    private int id;
    private static int count;

    public void setID(int id) {this.id=id;}
    public void printID() {System.out.println(id);}
    public static void incrementCount() {count++;}
}
```

(i) Write a Java statement that increments the customer count by 1.

(ii) Write a Java statement that declares a customer object called `client1` and initializes its `id` to 1001.

(iii) Write a Java statement to print out the customer id of `client1` object declared in part (ii).

(iv) What happen if the `Customer.setID(2001);` statement is issued? Justify your answer.

(6 marks)

Question 4

(a) Consider the following code segments:

```
int[][] list = new int[10][4];
int[] offset = {11, 13, 15, 17};
```

Write a for loop that sets the elements of the first row of `list` to `offset` and the remaining rows of `list` to three times the previous row of `list`. For example:

11	13	15	17
33	39	45	51
99	117	135	153

.....remaining row

(6 marks)

(b) Compare and contrast abstract classes and interfaces.

(4 marks)

SECTION B: (60 marks)

Question 5

(a) Write a program that prompts the user to enter the numerator and denominator of a fraction. The program determines whether the number is a proper fraction or an improper fraction. A proper fraction is a fraction where the numerator (the top number) is less than the denominator (the bottom number). An improper fraction is a fraction where the numerator (the top number) is greater than or equal to the denominator (the bottom number). If it is a proper fraction, display the number. If not, reduce it to a mixed fraction or to an integer. Here are sample runs:

Output 1
Enter a numerator: **45**
Enter a denominator: **46**
45/46 is a proper fraction

Output 2
Enter a numerator: **45**
Enter a denominator: **15**
45/15 is an improper fraction and it can be reduced to 3

Output 3
Enter a numerator: **45**
Enter a denominator: **25**
45/25 is an improper fraction and its mixed fraction is 1 + 20/25

(15 marks)

(b) The shipping cost (c) is determined based on the weight (w) of the package in kilogram. Write a code fragment with multi-way if statements to display the shipping cost of the package. Display a message "*The package cannot be shipped*" if the weight is not in the range.

if $0 < w <= 1$, c=3.5
if $1 < w <= 3$, c=5.5
if $3 < w <= 10$, c= 8.5
if $10 < w <= 20$, c=10.5

(5 marks)

Question 6

(a) Create an abstract class named `Element` that holds the following properties with protected access modifier:

- Symbol (e.g. symbol for carbon is *C*)
- Atomic number (e.g. Atomic number for carbon is *6*)
- mass (e.g. Atomic weight for carbon is *12.011*)

(i) Include a non-default constructor for all three properties.

(ii) Include an abstract method named `describeElement()`.

(iii) A getter method for each property.

(10 marks)

(b) Create a subclass called `MetalElement` of `Element` class which created in part (a). Include an attribute named `conductiveRank` (e.g. carbon conductive level is *11*). Include an appropriate constructor and implement the `describeElement` method to display all the details of the element.

(10 marks)

Question 7

(a) Rewrite the following code fragment with appropriate exception handling mechanism.

```
String inStr;
int num, result;
int[] array = {12, 4, 6, 8};
inStr = JOptionPane.showInputDialog(null, "Enter a number ");
num = Integer.parseInt(inStr);

result = array[num];
JOptionPane.showMessageDialog(null, "Result accessing array is "
+ result);
```

(8 marks)

(b) Write the following method that returns the sum of all numbers in an ArrayList.

```
public static double sum(ArrayList<Double> list)
```

(6 marks)

(c) Write a for loop to compute the value for the following expression:

$$4 \times (1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11})$$

(6 marks)

~THE END~

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