

CICT PART II SECTION 4

OBJECT ORIENTED PROGRAMMING

THURSDAY: 24 May 2018.

Time Allowed: 3 hours.

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.

ALL programs written should be in Java object oriented programming language.

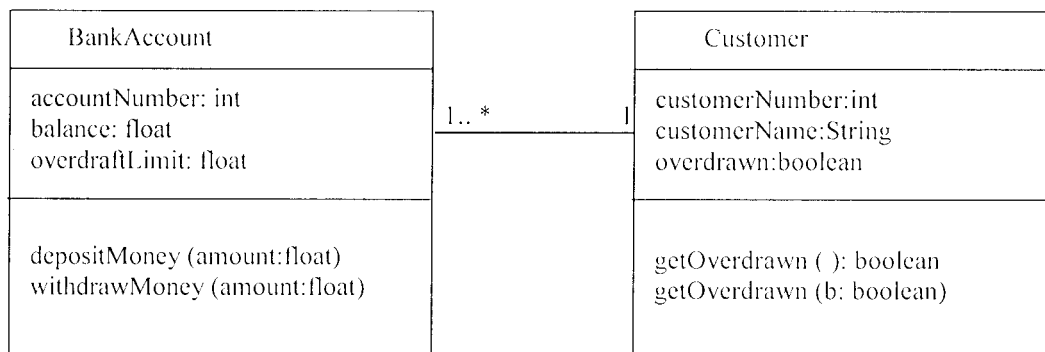
QUESTION ONE

- (a) (i) Define the term “design pattern” as used in object oriented programming languages. (2 marks)
- (ii) Highlight four advantages of using design patterns in programming. (4 marks)
- (b) (i) Write a method in Java named “isEven” that accepts an integer argument. The method should return true if the argument is an even number and false if otherwise. (3 marks)
- (ii) Write a program to test the method in (b)(i) above. (3 marks)
- (c) Outline five different types of events that could happen in a Java program. (5 marks)
- (d) With the aid of an example, explain how the ternary operator is used in Java. (3 marks)

(Total: 20 marks)

QUESTION TWO

- (a) Differentiate between “method overriding” and “method overloading” as used in object oriented programming. (4 marks)
- (b) Analyse the following UML Class diagram:



Required:

Interpret the meaning of the following object constraint language (OCL) statements:

- context: BankAccount : withdrawMoney(amount : float)
- pre: amount > 0 and Customer.getOverdrawn () = false
- post: balance = balance@pre – amount
If amount > (balance@pre + overdraftLimit)
then Customer.setOverdrawn (true)
endif

(6 marks)

- (c) Write a program that prompts the user to enter an integer number. If the number is less than 2 or greater than 5, it initialises a variable myNumber with 13, otherwise it initialises the variable with 26 and finally outputs the value of myNumber. (4 marks)

- (d) Create a constructor through a public class "Person" and a main method to display details of two students as follows:

Student ID	Name
0 1 2 4 5	Wachira
0 2 5 6 7	Omondi

The program should only display a student's ID and name.

(6 marks)
(Total: 20 marks)

QUESTION THREE

- (a) (i) The table below could be used to show the rules for accessing number variables from outside a class:

Modifier	Package	Subclass	World
Public	Yes		
Protected		Yes	
Default (No modifier)			No
Private	No		

Required:

Complete the above table by filling in either Yes or No in each of the blank cells.

(4 marks)

- (ii) Consider the following incomplete code:

```
import java.util.Scanner;
class Differ
{
    Public static void main (String args [ ])
    {
        Scanner scn = new Scanner (System.in);
        // Insert code here ...
    }
}
```

Required:

Write a code that should be inserted in the line written "//Insert code here..." such that when an integer "2018" and a string "kasneb" are entered at the prompt, the output is:

"You have entered: - 2018 and name as kasneb".

(3 marks)

- (b) Write a program with a super class named "Teacher" and a derived class named "EconomicsTeacher". The super class should have a property "designation" initialised to "teacher" and a method to print "Teaching" as the output. The derived class should have a property "MainSubject" initialised to "Economics" and a main function where an object of the derived class has been created to give the following output:

- Teacher
- Economics
- Teaching

(6 marks)

- (c) (i) Write a class program that uses try-catch constructs to ensure that a division by zero exception is handled during execution. (5 marks)

- (ii) Consider the program segment below:

```
new java programmer
Public class Demo {
    Public static void main (String [ ] args) {
        Employee e = new Employee ("Mr W.", "Weston, NRB", 1234);
        System.out.println("\n call mailcheck using Employee reference ..");
        e.mailCheck ( );
    }
}
```

Required:

If the "Employee" class is abstract, state the error that will be thrown when the program is compiled.

(2 marks)

(Total: 20 marks)

QUESTION FOUR

- (a) Explain the following concepts in relation to Java programming language:
- (i) Platform independent. (2 marks)
 - (ii) Byte code. (2 marks)
 - (iii) Naming convention. (2 marks)
- (b) Describe the two useful file utility methods that could be used to create directories through a program code. (2 marks)
- (c) Write a program to use a string buffer class to access and modify the string "Going Back" to "Go Back" and output the result. (3 marks)
- (d) Widening primitive conversions do not lose information but they preserve the numeric value.
Using the "int iValue = 50", write a program to support the above statement and output the iValue as a float. (3 marks)
- (e) Write a program which incorporates a method "sort" to sort by exchange the elements of an array {5, 3, 2, 4, 6}.
The program should sort the five numbers of type int above into an ascending order. (6 marks)
- (Total: 20 marks)**

QUESTION FIVE

- (a) Outline four standard principles of an object in object oriented technology. (4 marks)
- (b) Consider the following code segment:

```
Public class student {  
    Private String fname;  
    Private String lname;  
}
```

Required:

- (i) Extend the class to include a parameterized constructor to initialise the class data. (4 marks)
 - (ii) Create a main method that instantiates an object of the above class passing relevant arguments. (2 marks)
- (c) Explain why the following class raises a compile-time error in Java:
- ```
Public class T
{ public static void main (string ([] args){
int X;
System.out.println ("X is" + X);
}
}
```
- (2 marks)
- (d) Fonetech Mobile Company uses the schedule below to calculate monthly telephone bills in dollars (\$) for post-paid customers:

- Minimum \$20 for up to 100 calls
- Plus \$ 0.60 per call for the next 50 calls
- Plus \$0.40 per call for the subsequent 50 calls
- Plus \$ 0.20 per call for any call beyond 200 calls

**Required:**

Write a Java program that accepts the number of calls from the user and then calculates and outputs the monthly bill. (8 marks)

**(Total: 20 marks)**

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