UNIVERSITY OF GHANA

SCHOOL OF ENGINEERING SCIENCES
SECOND SEMESTER EXAMINATIONS: 2016/2017
LEVEL300: BACHELOR OF SCIENCE IN ENGINEERING
CPEN 312: OBJECT-ORIENTED PROGRAMMING WITH JAVA [*3 CREDITS*]

TIME ALLOWED: *1 HOUR 30 MINUTES*

INSTRUCTIONS:
Attempt ***ALL*** the questions. [50 MARKS]

Q1. a) State clearly the principle of Object-Oriented Programming (OOP) in Java. [2 marks]
b) As a new programmer employed by ESSOKO Inc. in Ghana, will you advise the company to adopt OOP method in all their programming projects? Give five (5) relevant reasons. [2½ marks]
c) Distinguish between polymorphism, inheritance and encapsulation in Java. [3 marks]
d) Discuss the ways in which inheritance promotes software reuse, saves time during program development and helps prevent errors. [4 marks]
e) Differentiate between procedural method of programming and object-oriented approach. [3 marks]
f) Develop a simple java program with two classes to output the name of a user to screen. Example, *Welcome "Prof. Alhaji Alhassan".* [3 marks]

Q2. a) Perform the following tasks for an array called *table*: [3 marks]
i) Declare and create the array as an integer array that has three rows and three columns. Assume that the constant ARRAY_SIZE has been declared to be 3.
ii) How many elements does the array contain?
iii) Use a ***for statement*** to initialize each element of the array to the sum of its indices. Assume that the integer variable *x* and *y* are declared as control variables.

b) Find the error in each of the following program segments. *Explain how to correct the error* and ***rewrite it again***.

i)
```
final int ARRAY_SIZE = 5;
ARRAY_SIZE = 10;
```
[2 marks]

ii) *Assume int[] b = new int[10];*
for (int i = 0; i <= b.length; i++)
b[i] = 1; [2 marks]

iii) *Assume int[][] a = {{ 1, 2 }; { 3, 4}}*
a[1, 1] = 5; [2 marks]

c) Find the error(s) in each of the following statements, and explain how to correct it (or them): [4 marks]

i) *buttonName = JButton("Caption")*
ii) *JLabel aLabel, JLabel;*
iii) *txtField = new JTextField(50, "Default Text")*
iv) *setLayout (new BorderLayout())*
button1 = new Jbutton("North Star");
button2 = new Jbutton("South Star");
add(button1);
add(button2);

Q3. Write a Java statement to accomplish each of the following tasks: [2½ marks]

a) Declare variables ***sum*** and ***x*** to be of type *int*.
b) Assign 1 to variable ***x***.
c) Assign 0 to variable ***sum***.
d) Add variable ***x*** to variable ***sum***, and assign the result to variable ***sum***.
e) Print "This sum is:", followed by the value of variable ***sum***.

Q4. Combine the statements that you wrote in question ***Q3*** into a Java application that calculates and prints the sum of the integers from 1 to 10. Use a *while statement* to loop through the calculation and increment statements. [3 marks]

Q5. State whether each of the following is ***true*** or ***false***. *If false, explain why or state the reason.*

a) By convention, method names begin with an uppercase first letter, and all subsequent words in the name begin with a capital first letter. [1 mark]
b) An ***import*** declaration is not required when one class in a package uses another class in the same package. [1 mark]
c) Empty parentheses following a method name in a method declaration indicate that the method does not require any parameters to perform its task. [1 mark]
d) Variables or methods declared with access modifier ***private*** are accessible only to methods of the class in which they are declared. [1 mark]
e) A primitive-type variable can be used to invoke a method. [1 mark]

f) Variable declared in the body of a particular method are known as instance variables and can be used in all methods of the class. [1 mark]

g) Every method's body is delimited by left and right braces ({ and }). [1 mark]

h) Primitive-type local variables are initialized by default. [1 mark]

i) Reference-type instance variables are initialized by default to the value null. [1 mark]

j) Any class that contains ***public static void main (String[] args)*** can be used to execute an application. [1 mark]

k) The number of arguments in the method call must match the number of parameters in the method declaration's list. [1 mark]

l) Floating-point values that appear in source code are known as floating-point literals and are type *float* by default. [1 mark]

Q6. a) Explain the purpose of a method parameter. What is the difference between a parameter and an argument? [3 marks]

b) Find the error(s) in each of the following and explain how to correct them. Assume that ***g*** is a Graphics object. [2 marks]

i) ***g***.setFont("SansSerif");

ii) ***g***.erase(x, y, w, h); *// clear rectangle at (x, y)*

iii) Font f = new Font("Serif", Font.BOLDITALIC, 12);

iv) ***g***.setColor(255, 255, 0); *// change color to yellow*