



**UNIVERSITY OF GHANA**

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**B.SC INFORMATION TECHNOLOGY, FIRST SEMESTER**

**EXAMINATIONS: 2016/2017**

**CSIT 205: OBJECT ORIENTED TECHNIQUES FOR IT PROBLEM SOLVING (3 CREDITS)**

**INSTRUCTIONS**

*Answer Question One (1) and any other three (3) Questions*

**TIME ALLOWED:**

*TWO AND A HALF (2½) HOURS*

**QUESTION 1 [Short Answer questions] [25 marks]**

**Write answers to this question clearly in your answer booklet.**

- a) An object is an entity with a well-defined boundary and identity that encapsulates \_\_\_\_\_ and \_\_\_\_\_.
- b) List two primary components of the .Net Framework. -----
- c) Two examples of VB.NET namespaces are -----
- d) Two approaches to program design include: -----
- e) Two primary logical programming constructs are -----
- f) An event occurs whenever an ----- detects an ----- and responds by running a method called an -----
- g) Objects interact with each other through \_\_\_\_\_

h) Two (2) short reasons why you would not use natural language in designing algorithms are -----

i) The process of building new classes from existing one is called \_\_\_\_\_.

j) Name two types of errors you may encounter in developing a program.

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Draw a sequence diagram that represents this process. Make sure to show when each actor is participating in the process. Also, show the operation that is carried out during each interaction, and what its arguments are. **[15 marks]**

**Question 3 [25 marks]**

a) i. Explain clearly the structure of a general Sub procedure (that is a subroutine) and the syntax for calling a Sub procedure VB.NET **[6 marks]**

II. What is the difference between passing a parameter by reference (ByRef) and by value (ByVal) ? **[4 marks]**

a) Write a VB application to have the user input via textbox an integer from 1 to 10 (inclusive) to specify the height and base of a right triangle. Display the triangle in a list box using strings made up of the '#' character. Create and display strings - one char at a time - using nested loops.

Example: Input: 4 Output: #

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[15marks]

#### Question 4 [25 marks]

a) Explain briefly DataAdapter and DataSet used for database connection in VB.NET

[5 marks]

b) Model with a **class diagram** the following System: Vending Machine.

A vending machine sells small, packaged, ready to eat items (chocolate bars, cookies, candies, etc.). Each item has a price and a name. A customer can buy an item, using a smart card (issued by the vending machine company) to pay for it. No other payment forms (i.e. cash, credit card) are allowed. The smart card records on it the amount of money available.

The functions supported by the system are:

- Sell an item (choose from a list of items, pay item, distribute item)
- Recharge the machine
- Set up the machine (define items sold and price of items)
- Monitor the machine (number of items sold, number of items sold per type, total

revenue)

The system can be used by a customer, a maintenance employee (who recharges items in the machines), and an administrator (who sets up the machine). [12 marks]

a) Enrich the model of the vending machine with **use case diagram**. [8 marks]

#### QUESTION 5 [25 marks]

- a) i. What is the formal definition of an algorithm? **[2 marks]**
- ii. Explain the four (4) parts of this definition. **[8 marks]**
- a) Write a VB application to have the user input a binary number via input box. Use a validation loop to ensure the input is a valid binary number. When valid, convert the number to a decimal value (use a function) and report the results via message box. **[15 marks]**

**QUESTION 6 [25 marks]**

A shipment is categorised as follows:

Value $\geq$ ghc300,000	grade A
Value $<$ ghc300,000 and $\geq$ ghc100,000	grade B
Value $<$ ghc100,000 and $\geq$ ghc30,000	grade C
Value $<$ ghc30,000	grade D

- a) Write a VB function Grade( ) that could be used to determine the category of a shipment given the Value of the shipment **[6 marks]**

- a) Design a VB windows application CSIT2052016 that does the following:

- Accepts the value of a shipment via inputbox
- Checks for and handles at least three types of exceptions in the data provided
- calls the function Grade() created in a) to find the category of the shipment and
- displays value of shipment and its Category through textboxes on the screen.

Provide a facility to clear the shipment and category values to allow the procedure to be repeated and a facility to exit at any time. Make your application user-friendly

- |                                                         |                   |
|---------------------------------------------------------|-------------------|
| I. Give a sketch of the interface (the form)            | <b>[2 marks]</b>  |
| II. Set properties for 4 objects used in the procedures | <b>[4 marks]</b>  |
| III. Write the code for any procedures required.        | <b>[13 marks]</b> |

Marks will be awarded for the appropriate use of MsgBox()/MessageBox.Show() function