

# KASNEB

## CICT PART II SECTION 4

### OBJECT ORIENTED PROGRAMMING

THURSDAY: 26 May 2016.

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

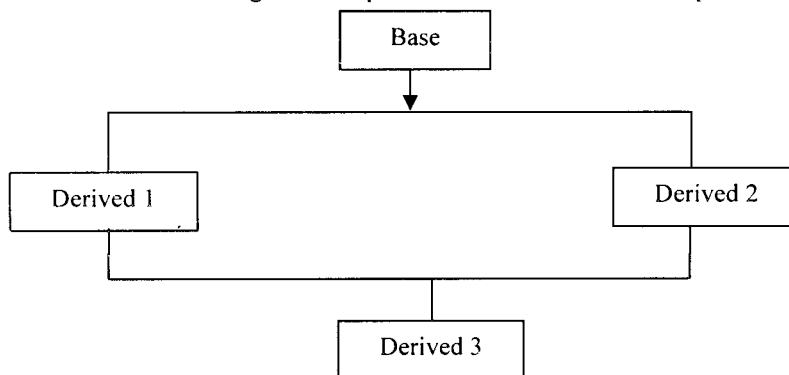
- (a) Java programs are either applets or applications.  
Differentiate between the two types of programs. (4 marks)
- (b) Illustrate the structure of the "main" method in Java programming. (4 marks)
- (c) Explain the following object oriented programming concepts:
- (i) Encapsulation. (2 marks)
  - (ii) Aggregation. (2 marks)
  - (iii) Function prototype. (2 marks)
  - (iv) Late binding. (2 marks)
- (d) Enumerate four advantages of using templates in object oriented programming. (4 marks)
- (Total: 20 marks)**

#### QUESTION TWO

- (a) Mary Phoebe has been requested to automate the mobile phone messaging system using an object oriented program.  
Justifying your answer in each case, suggest two possible classes and four possible methods that Mary Phoebe could use. (6 marks)
- (b) Write an object oriented program that will implement a class with the following properties:
- Has X and Y as data members;
  - Has member functions used to initialise the values of X and Y;
  - Contains an overloaded operator for checking equality.
- The program should create two objects with "a" and "b" values as (9,12) and (3,4) respectively. It should then compare the values of the objects using the overloaded operator and output the appropriate message indicating whether the objects have the same value or differ in value. (8 marks)
- (c) (i) Distinguish between state and behaviour of objects as used in object oriented programming. (4 marks)
- (ii) Describe the term "stack unwinding" as used in exception handling. (2 marks)
- (Total: 20 marks)**

#### QUESTION THREE

- (a) Distinguish between a "virtual function" and a "pure virtual function". (4 marks)
- (b) The figure below shows the design of multiple inheritance that could be implemented in an application.



This form of inheritance is prone to ambiguity.

**Required:**

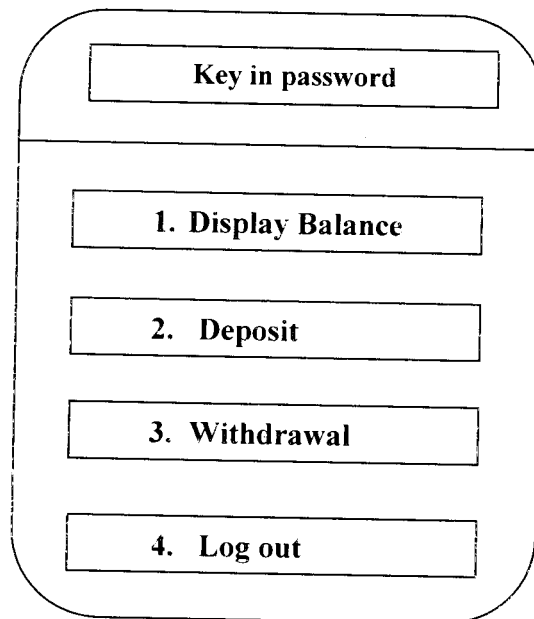
- (i) Explain the remedy used by programmers to ensure accuracy when handling the form of inheritance illustrated in the figure above. (4 marks)
  - (ii) Assuming that integers a, b and c are data members of Base, Derived 1 and Derived 2 classes respectively, write a program segment that would use a member function of Derived 3 to determine the product of a, b, and c. (6 marks)
  - (c) Describe the following types of variable scope as used in object oriented programming:
    - (i) Class scope. (2 marks)
    - (ii) Instance scope. (2 marks)
    - (iii) Protected scope. (2 marks)
- (Total: 20 marks)**

**QUESTION FOUR**

- (a) Outline four ways in which object oriented programming could improve programmer productivity. (4 marks)
  - (b) "Support for multiple inheritance is a necessary prerequisite for polymorphism in object oriented programming". Argue the case for or against the above statement. (5 marks)
  - (c) The JQuery Mobile framework is compatible with other mobile application platforms such as phoneGap and workLight. Outline six features of JQuery. (6 marks)
  - (d) Highlight five characteristics of destructors. (5 marks)
- (Total: 20 marks)**

**QUESTION FIVE**

The figure below shows a graphical user interface that simulates an automatic teller machine (ATM).



The user keys in the password. If the password is correct, the user is prompted to key in a number that corresponds to the function desired.

**Required:**

An object oriented program for the ATM simulator that executes the following tasks:

- (a) Validates a password entered in by the user and permits only three trials. (4 marks)
  - (b) Creates a menu as shown in the diagram above. (8 marks)
  - (c) Processes the balance, deposit, withdrawals and logs out of the system. (8 marks)
- (Total: 20 marks)**

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