# Open University of Mauritius

**BSC (HONS) APPLIED ICT WITH SPECIALISATION (OUbs017)**

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| **EXAMINATIONS FOR:** | November/December 2016 – Year 2 Semester 1 |
| **MODULE**: | Object Oriented Design Programming (OUbs017214) |
| **DURATION**: | 2 HOURS |
| **READING TIME**: | 15 MINUTES |

**INSTRUCTIONS TO CANDIDATES**

1. This paper consists of **3 Structured Questions**
2. Answer **ALL** questions
3. Always start a new question on a fresh page.
4. Total marks: 100.

**This question paper contains 3 Structured Questions and 4 pages.**

**ANSWER ALL QUESTIONS**

**QUESTION 1 [35 MARKS]**

a) Define the following terminologies as used in Object Oriented Programming and provide an example of each:

(i) Instantiation
(ii) Instance Variable
(iii) LinkedList
(iv) Class association
(v) Virtual Method

**[10 marks]**

b) Early programming languages did not support an object oriented approach to programming. Explain why and how object oriented programming languages have been developed?

**[5 marks]**

c) A class Lorry has only 2 attributes, noOfTyres (int), longVehicle (boolean) and brand (String). Write a java program that implements the vehicle class using Encapsulation principles.

**[10 marks]**

d) Using the collection of ArrayList, write a java program that will declare, and insert 3 values in an ArrayList called Cars (Make). The program should then display the size and check whether "BMW" is one of the cars of the ArrayList. Finally it displays the whole array.

**[10 marks]**

**QUESTION 2 [35 MARKS]**

a) Another important principle of Object Oriented Programming in Polymorphism. Using an appropriate example, explain polymorphism as applied to Object Oriented Programming.

**[8 marks]**

b) A Product can be an Album, a Book or a Movie. Products have attributes such as Title and Price as well as methods purchase and download. Album has attribute Artist. Book has attribute Author. Movie has attribute Director. Using the principles of inheritance show how this scenario can be implemented in Java.

**[8 marks]**

c) The Library of Open University is a public library that stores various items that can be borrowed, including books, journals, music, photographs and films. The Library is open to both members and non-members, but only members can borrow up to ten items. Members must join first, by providing proof that they live in the Open University area. Non-members, however, can apply to use the facilities only, such as the Wi-Fi and photocopiers. Books can be borrowed for two weeks and other items, such as music and films for one week. If the borrower keeps the item longer than this, they are subjected to a fine, which is increased daily.

When a user borrows an item, they provide their libraryNo, if this is valid their loan details are checked to ensure that they have not already borrowed above the maximum permitted number of items. A check is also made to see if they have any fines. If they have a fine, then they cannot borrow any items until the fine is paid. If all the checks are OK, then the item is issued to the user and the return date is assigned to the loan. At this point the user can optionally ask for a printout, which summaries all of the items they have on loan and when each item is due back.

Library users can reserve items that are currently out on loan. If an item proves to be very popular, then the librarian will order a new copy, provided it does not exceed the budget.

Members can register for online facilities so that they can check their own loan details at any time. Once registered, a member can also renew their loans online, provided that the item has not been reserved.

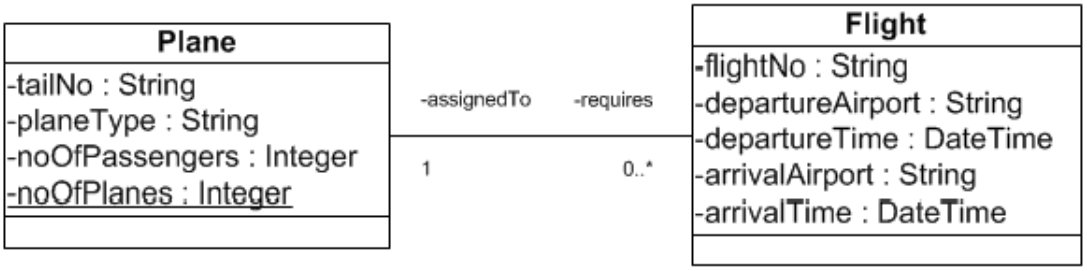
(i) Draw a **USE CASE** diagram for the library system

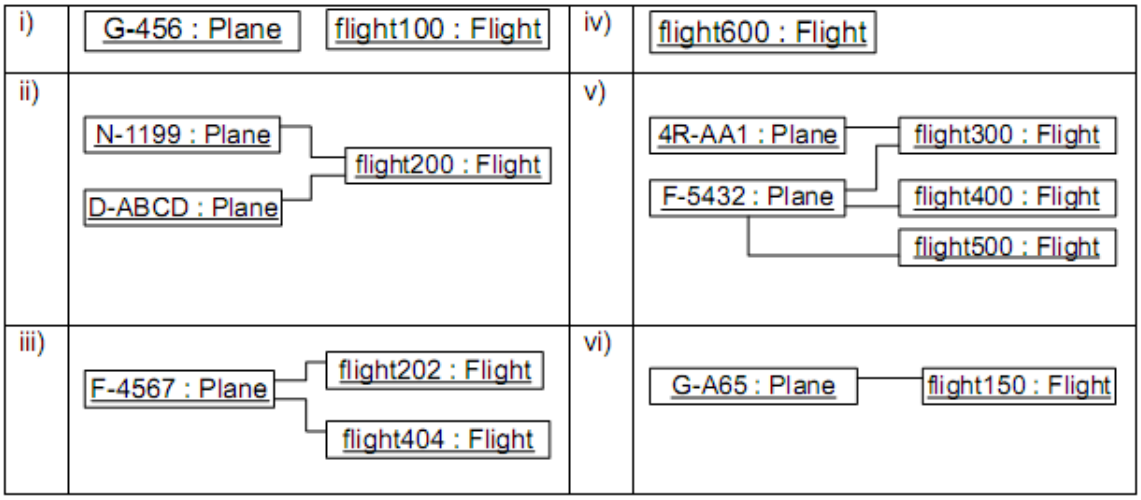
**[9 marks]**

(ii) Draw a **SEQUENCE** diagram for the library system

**[10 marks]**

**QUESTION 3 [30 MARKS]**




(a) Given the class diagram above, state which of the object diagrams (i-vi) are legitimate instances. Assume that all links in the object diagram are instances of the association shown in the class diagram. If an object diagram is not legitimate explain why not.

**[10 marks]**

(b) In an object-oriented programming language that you are familiar with, write code to implement the class diagram above. Within your code provide a default constructor for each class that sets the variables to appropriate initial values. The class variable should be set and incremented appropriately.

**[10 + 10 marks]**