INSTITUTE OF TECHNOLOGY BLANCHARDSTOWN

Year	Year 2
Semester	Semester 2
Date of Examination	Monday 21st Jan 2013
Time of Examination	9.30am – 11.30am

Prog Code	BN002	Prog Title	Higher Certificate in Science in Computing in Information Technology	Module Code	COMP H2031
Prog Code	BN013	Prog Title	B.Sc. in Computing in Information Technology	Module Code	COMP H2031
Prog Code	BN104	Prog Title	B.Sc. (Honours) in Computing	Module Code	COMP H2031

Module Title	**Object Oriented Analysis and Design**

Internal Examiner(s): *Frances Murphy*
External Examiner(s): *Mr. Michael Barrett and Dr. Tom Lunney*

Instructions to candidates:

1) To ensure that you take the correct examination, please check that the module and programme which you are following is listed in the tables above.

2) This paper contains 4 questions.

3) You are required to answer 3 questions (Question 1 and any 2 other questions of your choice).

4) Question 1 is compulsory and is worth 40 marks.

5) All other questions are worth 30 marks.

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PART A – Compulsory Question

Question 1

This question is divided in to 12 parts, (i) to (xii). Answer **any 10 of the 12** parts. Each part is worth **4** marks.	
(i)	Explain the difference between an **actor** and a **use case.**
(ii)	Explain, and give an example of, an **<<include>>** relationship in a use case diagram.
(iii)	What is the difference between an **object** and a **class** in an object oriented system?
(iv)	Distinguish between the terms **abstract class** and **concrete class.** Illustrate your answer by means of an example and a class diagram.
(v)	Explain what an **alternative scenario** is, and why it may occur.
(vi)	Draw a class diagram of the following, indicating whether **composition** or **aggregation** exists. State a reason for your answer. • A book is composed of one or more pages.
(vii)	Draw an **activity diagram** to capture the following series of events: • A user logs on to a website, which allows them to select a product, if they enter a valid username and password. • If they enter an invalid username and password, an error message is displayed and no further activity takes place.
(viii)	Identify, and explain, each of the components in the following call message taken from a sequence diagram: *[nonPayment]processFine(String name)* ⟶
(ix)	Describe what a Use Case Specification is. State **two** occasions where it is used in the software development life cycle.
(x)	A proposed **robot** class has the following instance variables: *robotId:Integer* *robotName: String* Write out the *getter* and *setter* methods for these instance variables.
	Question 1 continued overleaf

	Question 1 continued
(xi)	A proposed **Account** class has the following instance variables: *accountNo: String* *accountName: String* *interestRate: Double* Assume **two** constructors have been declared in the class, one being the **default constructor** and the other a **user-defined** constructor which takes three parameters. Write Java code to demonstrate how each type of constructor is used to instantiate an object / objects.
(xii)	Answer the following questions relating to the scenario below: • A student prepares for their exams by studying the lecture notes. • In order to cover the course fully, he must also read texts from the library. • Due to unforeseen circumstances e.g. illness, a student may not be able to prepare for their exams. (a) Name the actor. (b) Name the main use case. (c) Name the <<includes>> use case. (d) What type of use case is created by the following statement: *Due to unforeseen circumstances e.g. illness, a student may not be able to prepare for their exams.*

Total (40 marks)

PART B - Answer any 2 questions of your choice.

Question 2

(a)	Describe the **four** phases of the **RUP** approach to software development.	**(10 marks)**
(b)	List **4 reasons** why 80% of software projects fail or are never delivered.	**(4 marks)**
(c)	List **6 reasons** why developing UML models of a software system aid the development of better quality software.	**(6 marks)**
(d)	Explain how the following UML diagrams relate to one another: (i) Class Diagram (ii) Sequence Diagram (iii) State Chart Diagram Illustrate your answer by means of examples.	**(10 marks)**

Total (30 marks)

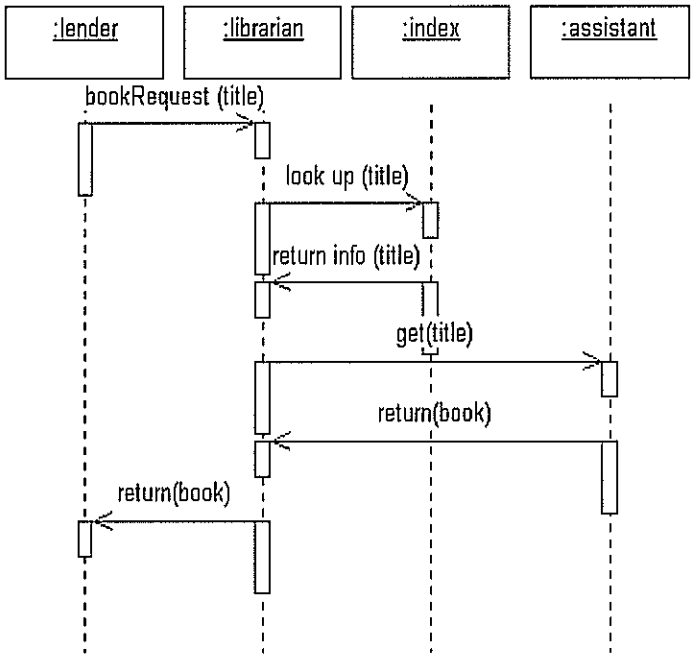
Question 3

(a)	Draw a **use case diagram** to represent the following scenario: DigiPrint is a company that specializes in digital printing over the web. • New customers must register with the system, before they can use it. • All customers must login to the system. If they login incorrectly, an error message is displayed. • Each customer must create an album for each set of photographs they want to upload for printing. • Each customer has a file storage limit of 200mb. If they exceed this limit, they cannot load any further photographs. • Once they have uploaded their photographs, they can place an order. • When they have placed an order, they are prompted for their delivery and credit card details. • The customer can optionally print out the details of their order. • Every 10 days, the administrator sends an email of special offers to customers who have not placed an order for 3 months.	**(15 marks)**
(b)	Consider the following system for a bank: • A branch has many employees. • Some of the employees work as business managers. • A branch has many accounts which are held by customers. • Customers may hold more than one account at a branch. • There are two types of customers; business customers and personal customers. • The business managers liaise with the business customers. Draw a **class diagram** to represent the description above. Make sure to show *multiplicities*, and *inheritance / aggregation / composition*, where appropriate. There is no need to show any operations.	**(15 marks)**

Total (30 marks)

Question 4

(a)	Draw a **sequence diagram** to represent the following scenario: A student can perform a math test on a website. • The student begins by logging in. (Assume they have previously registered). • Each question is presented on the screen, one question at a time. • The student answers each question and the system checks if the question has been answered correctly. • The student is informed of the correct answer before continuing on to the next question. • The system keeps a running score of each correct answer and at the end of the test, the student is shown their score. • At that stage, they can choose to continue to the next test in the series or they can retake the current test.	**(10 marks)**
(b)	Answer the following questions, with reference to **state chart diagrams:** (i) What is a state chart diagram? (ii) How are states represented in a state chart diagram. (iii) How are transitions represented in a state chart diagram? (iv) When is a superstate used in a state chart diagram? (v) Name the 3 components associated with a labelled transition. (vi) Explain what each component in a labelled transition represents. (vii) Provide an example of a timeout event. (viii) Provide an example of a conditional event.	**(10 marks)**
	Question 4 continued overleaf	

	Question 4 continued	
(c)	Convert the following **sequence diagram** into a **collaboration diagram.** 	**(10 marks)**

Total (30 marks)