

Year	Year 2
Semester	Semester 2
Date of Examination	Repeat 2011
Time of Examination	Wednesday 24 th August 2011 1.00pm – 3.00pm

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
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Internal Examiner(s): *Frances Murphy*
External Examiner(s): *Mr. John Dunnion, Dr. Richard Studdert*

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.

DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD TO DO SO

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 the “ main success scenario ” or “ primary ” path and the “ alternate ” path in a use case.
(ii)	Explain, and give an example of, an << extends >> relationship in a use case diagram.
(iii)	What is the difference between a class and an object in an object oriented system? Use examples to illustrate your answers.
(iv)	Explain the concept of inheritance , with respect to object oriented programming. Illustrate your answer by means of a <i>code sample</i> .
(v)	Illustrate the following relationships using a class diagram . Your diagram should include <i>labeled association names</i> and <i>multiplicity</i> . <ul style="list-style-type: none"> • Customers order our products. • There are two types of customers: corporate customers and personal customers.
(vi)	Explain the term aggregation . Illustrate your answer by means of a <i>code sample</i> .
(vii)	Draw an activity diagram that captures the following workflow for a conference organizer. <ul style="list-style-type: none"> • A conference organiser receives an itinerary. • He/She then sends this to a guest speaker. • The guest speaker either confirms the itinerary or fails to respond within 48 hours. • If no response has been received, the conference organiser cancels the itinerary. • Otherwise, the conference organiser books the itinerary.
(viii)	In a statechart diagram, a transition label may consist of three elements. Identify the three elements in the following label and explain what the label below means. <div style="text-align: center; margin-top: 10px;"> $\xrightarrow{\text{Register[num_students < 20]/process documentation}}$ </div>
Question 1 continued overleaf	

Question 1 continued	
(ix)	<p>Draw a state chart diagram which represents two players playing a game of draughts.</p> <ul style="list-style-type: none"> - It is either white or black's turn to move a draught around the board. - The game is over when either: <ul style="list-style-type: none"> o black wins o white wins or o the game ends in a draw.
(x)	What is meant by the visibility of an attribute? Explain the UML symbols associated with the visibility of attributes.
(xi)	Distinguish between the terms abstract class and concrete class . Illustrate your answer by means of an example.
(xii)	Explain the concept of Polymorphism as used in OO programming. Illustrate your answer by means of an example.
Total (40 marks)	

PLEASE TURN OVER FOR QUESTIONS 2, 3 AND 4.

PART B - Answer any 2 questions of your choice.

Question 2

(a)	Describe the <u>four</u> phases of the RUP approach to software development.	(10 marks)
(b)	UML splits the modeling of a software system into <u>five</u> main views. Name the <u>five</u> views and write an account of <u>two</u> of the views, describing: <ul style="list-style-type: none"> • what the view does • what the view focuses on, <i>and</i> • who the view is of interest to 	(10 marks)
(c)	Draw a sequence diagram representing the following process. <ul style="list-style-type: none"> • When a user returns an item to the library, the library clerk updates the database and records the date when the item was returned. • If the item is overdue, the clerk collects a fine calculated as DaysLate * €1. • The clerk also records the fine collected in the database. • In addition, the clerk checks if the returned item is damaged, and if so, records the information in the database again. 	(10 marks)
Total (30 marks)		

PLEASE TURN OVER FOR QUESTIONS 3 AND 4.

Question 3

(a)	<p>Consider the following scenario and model it as a use case diagram:</p> <p><i>Little Rascals</i> is a pre-school for young children under 4 years of age. The company wishes to keep information on the children and the staff who work there.</p> <ul style="list-style-type: none"> • Two types of staff are employed; Administrators and Child Minders. • Personal details are recorded by the Administrator for all staff and, if they are a Child Minder, they must also pass a police check. • The system must record when this has been passed and when it must be renewed. • When a child starts at the nursery, an Administrator records the child's personal details. • As part of the registration process, the Administrator also records the details of who is allowed to collect the child. • The Child Minder will print these details, so that they can check that the person collecting the child at the end of a session is authorised to do so. • Some children have special needs requiring medication, such as asthma, and the Administrator will record details about their condition. • There are three different classes in <i>Little Rascals</i>. After an initial assessment the Child Minder is responsible for allocating each child to a class appropriate to his/her age and ability. • Each week the children take part in a number of activities and for these they may need to bring in additional items from home. The Child Minder will generate a weekly letter for the parents to advise them of what they need to bring in. 	(15 marks)
(b)	<p>Draw a class diagram to represent the following scenario. Make sure to show attributes, multiplicities, aggregation / composition / inheritance and associations, as appropriate. There is no need to show any operations.</p> <ul style="list-style-type: none"> • Companies employ employees (who can only work for one company). • Each company consists of one or more departments. Each company has one C.E.O. who is an employee. • Departments have employees and employees are assigned to projects. • There are three types of employees: full-time, part-time and contract. • Each employee may work on one to three projects, at any given time and each project can have between 2 and 30 employees assigned to it. • The name and address of each company is recorded, as is the employee id and salary of each employee. 	(15 marks)
Total (30 marks)		

Question 4

(a)	Explain the term swimlanes, with respect to an activity diagram, and explain their purpose. Use an example to illustrate your answer.	(3 marks)
(b)	<p>A customer can buy books by calling the Sales Department of XYZ Book Shop by phone and providing Sales with order details.</p> <ul style="list-style-type: none"> Once Sales receive the order, a clerk will check for the membership status of the customer. If a customer's membership is still valid, Sales will enter the order details, as given by the customer. Sales will then pack the items, await for shipment and, at the same time, the Accounts Department will create an invoice which they will send out. If the Accounts Department has received a cheque from the customer, the cheque will be lodged in the bank account. If the cheque is settled with the bank, then Sales will arrange the shipment for the customer. The order will then be completed. <p>Represent the scenario above as a partitioned activity diagram which uses swimlanes.</p>	(12 marks)
(c)	<p>Draw a state chart diagram that describes the lifetime of a video in a video store.</p> <ul style="list-style-type: none"> When a video is purchased, it is packaged properly (plastic case with identification information on the outside) and its details are entered in the video store database. It is then displayed in the store for rental. Customers, who chose to rent it, check it out and return it within 3 days. If the video is damaged on return, it is removed from the database. If a person fails to return the video, the store rings him / her the next day. The person is contacted again, if they haven't returned the video within a further two days. The store then delegates the collection of the video to a collection agency and removes the video from the database. Finally, if the video is missing when the annual stock-taking takes place, it is removed from the database as well. 	(15 marks)
Total (30 marks)		