University of Ruhuna - Faculty of Technology
Bachelor of Information & Communication Technology
Level 1 (Semester 2) Examination, December 2017

Course Unit: ICT1223 Object Oriented Analysis & Design (Theory)   Time : 2 ½ hours

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Answer all five questions

1.

   a. State whether each of the following statement is **true** or **false**
      i. Object oriented analysis, emphasizes finding and describing the concepts in the problem domain.
      ii. In Object Oriented paradigm, procedures and data are designed separately.
      iii. The more specific class of a generalization hierarchy, is called the super class.
      iv. In Object Orientation, packaging related data and operations together is called encapsulation.
      v. In Object Orientation, breaking up a complex system into manageable components is called as abstraction.

   b. Consider the following description regarding a library.
      Books, magazines and newspapers are different types of library references. Novels and short stories are two types of books. Daily and weekly newspapers are two types of newspapers.
      Draw a generalization hierarchy for the above case.

   c. *"Unified Process is an iterative and incremental software development process."*
      What is mean by "iterative" and "incremental" in the above statement?

   d. What is mean by **high cohesion** and **low coupling** in the object-oriented software development?

   e. Name the four phases of the Rational Unified Process and list two activities done in each phase.

2.

   a. State whether each of the following statement is **true** or **false**
      i. Activity diagrams focus on modelling dynamic aspect of a system.
      ii. In an activity diagram, a decision node takes multiple input flows and outputs a single outgoing flow.
      iii. In an activity diagram, one can split a path into two or more concurrent flows using a join node.
      iv. Use cases are used to model non-functional requirements of a system.
      v. Use cases are stories of a user, using a system to meet his/her goals.

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b. Name two types of actors specified in use case modeling and briefly explain each of them.

c. Read the following passage which describes a University Career Guidance Portal (CGP).

Using CGP, students can make requests to student counsellors. First, the student has to log in to the system. If the login is not successful, then the user can re-enter login details. After a successful login, the system displays the student's page, with a link to counsellor details. When the student clicks the link, the system displays a list of counsellors and their details. Using that, the student can select the counsellor of his/her choice. Once the counsellor is selected, the system displays a query field to type and submit a question to the counsellor. If the query field is left blank, then the system gives the error "Please fill the query field" and display the query field again. Otherwise, the message "Query submitted" will be displayed and at the same time a notification email is sent to the counsellor. Finally, the student can logout the system.

Draw the activity diagram with partitions for the "Make requests to counsellor" use case.

3.

a. Name the three goal levels used in use case modeling.

b. Construct a use case in fully dressed format for the following description of an online library system.

(Note: You should only include the use case name, primary actor, pre-condition, main success scenario, and extensions sections in your fully dressed format use case).

Using the online library system students can search for books online. First the student logs into the system. If the login is successful then he/she can enter the book name/author name or ISBN number and click search button. Otherwise, the system will display the login page again. If the search is successful then the book details are displayed on the screen. Otherwise, if the searching parameters are wrong, the system will display the error message "Please enter valid details", else if the book is not available in the system the message "No search results to show" will be displayed.

c. Construct the use case diagram by considering the user level goals of the following scenario.

In an online banking system, customer can open accounts, check the account balance, deposit funds, transfer funds and withdraw funds from his/her account. If the customer is an NRFC customer, then he/she can convert the currency online. When a customer is opening an account online, a bank officer is involving with the process. It is necessary to update the balance of the account when a customer depositing, withdrawing or transferring money. The system can calculate the bonus for deposits if the amount is over Rs.10,000.00.

4.

a. Name four types of relationships specified between classes in UML class diagrams. Draw the notation of each relationship type

b. Noun/ verb analysis is a way to identify classes in a problem domain. List the steps in noun/ verb analysis procedure.

c. Consider the following description.

In an online shopping system, customer can buy items by making orders online. Customer can order items using the system. To make an order, customer's name and location details are needed. For a particular order, there is a date, order number and the amount. An order can be confirmed, dispatched or cancelled. There are two types of orders which are special orders and normal orders. Special orders provide discounts if the order amount exceeds Rs.50000.00. Items of an order have an item id and a name.

i. Identify the classes in the given case study.

ii. Draw the class diagram with attributes and methods by indicating the appropriate multiplicities between classes.
(Do not need to indicate the accessibility types of the attributes and methods)

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5.

a. Briefly explain three different types of messages in communication diagrams by giving relevant notations.

b. Fill the given below table by giving one strength and one weakness of communication and sequence diagrams.

	Communication diagram	Sequence diagram
Strengths		
Weaknesses		

c.

i. Briefly explain the use of activation boxes in sequence diagrams?

ii. Consider the basic flow of the fully dressed format use case given below.

Success scenario:

1. The librarian checks the availability of book.
2. If the book is available then the rack number of that book will be returned to librarian.
3. librarian checks the validity of the member using the member record.
4. If the member is valid, then the 'librarian checks whether the member is eligible to have the book by checking the number of books already issued.
5. If the member is eligible, book is issued to him and a transaction is created.
6. The librarian adds the member and book details to the transaction.
7. Librarian then update the member records and update the status of the book.

Identify classes and construct a sequence diagram to realize the above use case (Clearly show message flows, objects and state any assumptions you made)

***************** End *****************