

UNIVERSITY OF RUHUNA  
BACHELOR OF SCIENCE (GENERAL) DEGREE

LEVEL II (SEMESTER I) EXAMINATION – JUNE/JULY 2015

COM212β – Object Oriented System Development (Theory)

Duration: 2 hours

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Answer **four** questions **only**

1)

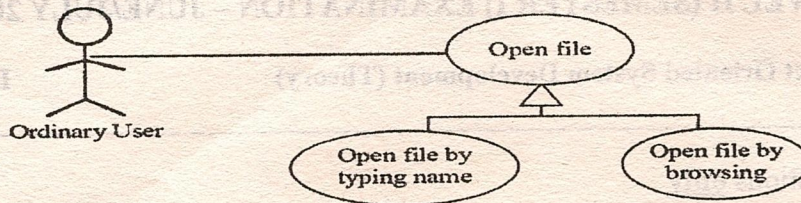
- a) What is the purpose of an access modifier? State and explain the four types of access modifiers in Java programming language.
- b) What is the purpose of association classes? Draw a class diagram for a suitable example where an association class is used. Draw equivalent alternative design of the class diagram you have drawn.
- c) Consider the following description:

*Water can exist in several states: liquid, vapors, ice and plasma. Several transitions are possible from one state to another. Freezing is the phase change from liquid state to ice. Condensation is the phase change from vapors to liquid. Water vapors can be turned directly into ice through deposition. Water vapors turn into plasma by ionization and plasma turn into water vapors by deionization. The ice can be directly turned into vapors by sublimation and melting turns ice into liquid. The vaporization is the reverse process of condensation.*

Draw state diagram to represent the above scenario.

2)

- a) File handling is a major task supported by any operating system. Consider the use case diagram corresponding to file handling given below.



- i. Write down the use case description (fully dressed format in two columns) for the use case "Open file by typing name".
  - ii. Write down the use case description (fully dressed format in two columns) for the use case "Open file by browsing".
- b) Consider the following scenario regarding patient handling process by a receptionist at a hospital:

*Patient registration is one of the major tasks performed by receptionist. In addition to that she is responsible for scheduling admission of patients to the hospital and scheduling appointments with doctors.*

*Generally, patients admitted to the hospital should be registered first. Registered patients are scheduled for admission by the receptionist. Scheduled patients can be admitted to the hospital later. However in exceptional cases, the receptionist can register patients while scheduling. In emergency situations, the receptionist can register patients even at the time of admission to the hospital.*

*A patient can be admitted to the hospital either as an inpatient or an outpatient. For each inpatient, a bed should be allocated.*

Draw the use case diagram for the above scenario. Clearly show any relationships such as generalizations, inclusions, and extensions between the use cases.

3)

- a) Consider the following description:

*A company has zero or more employees. An employee can only work for one company. It is not possible to be an employee unless he or she works for a company.*

Draw UML class diagram showing classes, associations and multiplicities (attributes and operations are not necessary for your diagram).

- b) Implement the class diagram in (3) (a) above. Assume that an employee has an attribute called **name**. You only have to use appropriate attributes and behavior required to implement the association between classes.
- c) Following table shows two companies and their employees. Write the code segment to create Company and Employee objects given in the table below.

Company	Employee
ABC	Kamal
	Nimal
XYZ	Saman

4)

- a) Consider the following scenario:

*The design class diagram of an application to be developed for a shopping complex has three classes: Bill, Purchase and Item. The Item class contains a method to get unit price of a given item. The Purchase class contains a method to compute sub total price for a given particular item. The Bill class contains a method to compute the total cost of purchased set of items.*

Draw sequence diagram showing interaction between objects in the above application.

- b) Draw an activity diagram for the following scenario. (partitioning/swim lanes is not required)

*When an order is received, **filling order process** and **sending invoice** tasks begin in parallel. After the order is filled, the delivery can be done either in regular way or overnight. The payment is received after sending the invoice. The order is closed after receiving the payment and delivering the products.*

5)

- a) What is the difference between a class and an object?
- b) List down the suggested sequence of activities to design a class diagram.
- c) State two possible situations where an interface should be created instead of a super class.

- d) Explain the difference between aggregation and composition relationships using suitable examples.
- e) Following figure shows a sequence diagram in course registration system provided for students. Several students may register to a given course while one student may register to several courses.

Considering the above description and the sequence diagram given below, draw the corresponding class diagram carefully identifying the classes and their operations.

