



UNIVERSITY OF COLOMBO, SRI LANKA



UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (*EXTERNAL*)

Academic Year 2017 – 2nd Year Examination – Semester 3

*IT3105 – Object-Oriented Analysis and Design
PART 1 - Multiple Choice Question Paper*

3rd June 2017
(ONE HOUR)

Important Instructions:

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- The paper has **30** questions and **12** pages.
- All questions are of the MCQ (Multiple Choice Questions) type.
- All questions should be answered.
- Each question will have 5 (five) choices with one or more correct answers.
- All questions will carry equal marks.
- There will be a penalty for incorrect responses to discourage guessing.
- The mark given for a question will vary from 0 to +1 (*All the correct choices are marked & no incorrect choices are marked*).
- Answers should be marked on the special answer sheet provided.
- Note that questions appear on both sides of the paper.
If a page is not printed, please inform the supervisor immediately.
- Mark the correct choices on the question paper first and then transfer them to the given answer sheet which will be machine marked.
Please completely read and follow the instructions given on the other side of the answer sheet before you shade your correct choices.
- Calculators are **not** allowed

In questions 1-5, fill in the blanks with the most appropriate answer.

- 1) is a mechanism to filter out an object's properties and operations until just the ones you need are left after ignoring the irrelevant and unimportant ones.

(a) Inheritance	(b) Encapsulation	(c) Polymorphism
(d) Abstraction	(e) Specialization	

- 2) means that the same message can be interpreted differently by different classes of objects.

(a) Polymorphism	(b) Specialization	(c) Encapsulation
(d) Generalization	(e) Composition	

- 3) is the process of binding both attributes and methods together within a class and through it, the internal details of a class can be hidden from outside.

(a) Encapsulation	(b) Inheritance	(c) Generalization
(d) Polymorphism	(e) Specialization	

- 4) A/An diagram illustrates the objects that participate in one scenario and the messages that pass between them over time.

(a) Activity	(b) use case	(c) sequence
(d) class	(e) state	

- 5) diagram is a structure diagram which describes a lightweight extension mechanism to UML by defining custom stereotypes, tagged values and constraints.

(a) Class	(b) State	(c) Profile
(d) Deployment	(e) Component	

- 6) Which of the following diagrams is/are UML *Interaction* diagrams?

(a) Timing Diagram
(b) Sequence Diagram
(c) Interaction Overview Diagram
(d) Activity Diagram
(e) Communication Diagram

- 7) Which of the following statements is/are correct regarding Software Process Models?

(a) A software process model is an abstract representation of a software process.
(b) Each process model provides complete information about the process.
(c) Incremental development is a software process model used only in SCRUM software development framework.
(d) In incremental development, a system is developed as a series of versions with each version adding functionality to the previous version.
(e) Software process models are often used together in large systems development.

- 8) Which of the following statements is/are correct regarding Software Development Processes and Process models?
- (a) The problems of incremental development become particularly serious for large complex and long life time systems, where different teams develop different parts of the system.

(b) The goals of the *Elaboration* phase of the Rational Unified Process (RUP) are to develop an understanding of the domain problem, establish an architectural framework for the system, develop the project plan and identify key project risks.

(c) RUP is a recommended process for embedded software development.

(d) RUP represents an approach that potentially combines waterfall, incremental development and Reuse-oriented software engineering software process models.


(e) Waterfall model, incremental development and reuse-oriented development are examples of process models.
- 9) Consider the following statements with regard to Rational Unified Process (RUP).
- (i) The main goals of the *Inception* phase in RUP is to establish a business case for the system.
- (ii) On completion of the *Elaboration* phase, the requirements documentation consists of a set of UML use cases, an architectural description, and a development plan for the software should be ready.
- (iii) Transition phase of the RUP is concerned with moving the system from the development community to the user community and making it work in a real environment.
- Which of the above statements is/are correct?
- (a) Only (i) (b) Only (iii) (c) Only (i) and (iii)

(d) Only (ii) and (iii) (e) All
- 10) Consider the following statements related to *association* between an Actor and a Use case in a Use Case diagram.
- (i) It is modelled with dashed line.
- (ii) UML 2.5 allows multiplicities.
- (iii) It is modelled with a directed edge with the arrowhead always pointing to the Use Case.
- Which of the above statements is/are correct?
- (a) Only (ii) (b) Only (iii) (c) Only (i) and (ii)

(d) Only (i) and (iii) (e) All
- 11) Which of the following statements is/are correct regarding the UML Use Case modelling?
- (a) The set of Use Cases identified, represents all the possible interactions that will be described in the system requirements.

(b) In UML 2.0, Actors may also represents other subjects, giving the modeler a way to link different Use Case models.

(c) An automatic system backup that runs every evening can be modelled in UML 2.0 as given below.



(d) The include relationship could be used to simplify a large Use Case by splitting it into several Use Cases and to extract common parts of the behaviours of two or more use cases.

(e) Use Case diagrams cannot be drawn if you are following a non-object oriented methodology.

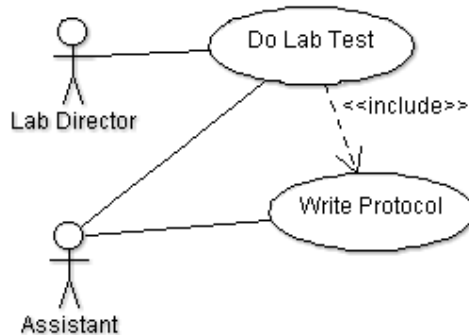
12)

Consider the following statement.

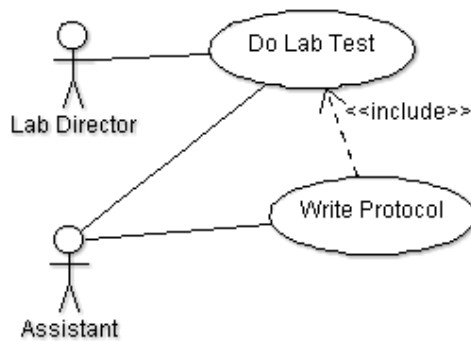
“The lab director does a lab test together with his assistant. The assistant always has to write a protocol during the lab test.”

One needs to model the above situation with a UML 2 *Use case diagram*. The following are three alternative diagrams drawn.

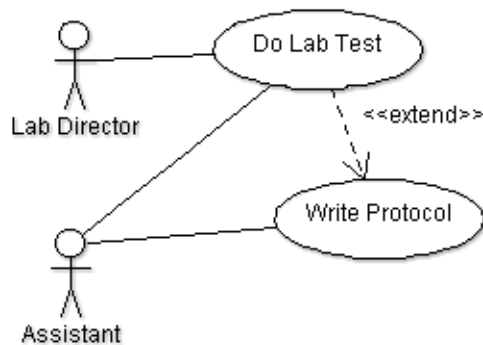
(i)



(ii)



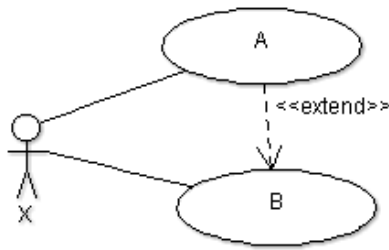
(iii)



Which of the above diagrams is/are correct?

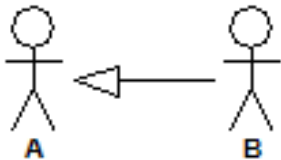
- (a) Only (i)
- (b) Only (ii)
- (c) Only (iii)
- (d) Only (i) and (ii)
- (e) Only (ii) and (iii)

- 13) What does the <<extend>> relationship in the following diagram mean?



- (a) B might or might not invoke A.
 (b) A might or might not invoke B.
 (c) A can extend B.
 (d) B always has to invoke A.
 (e) A cannot be executed without B.

- 14) Consider the following diagram and the statements given thereafter.



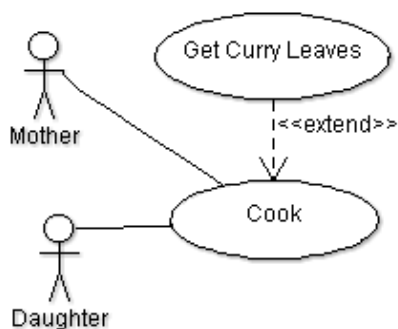
- (i) B can execute the same use cases as A.
 (ii) B inherits all of A's associations.
 (iii) A can execute the same use cases as B.

Which of the above statement(s) is/are true?

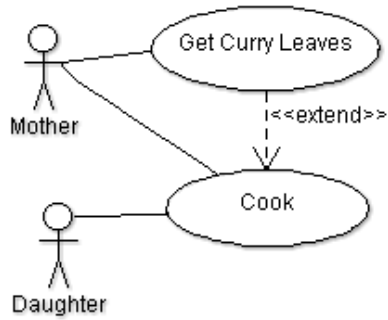
- (a) Only (i)
 (b) Only (ii)
 (c) Only (iii)
 (d) Only (i) and (ii)
 (e) Only (ii) and (iii)

- 15) Consider the following situation:
 “Mother and the Daughter cook dinner together. Sometimes it is necessary that one of them gets curry leaves from the garden.”
 One needs to model the above situation with a UML 2 *Use case diagram*. The following are three alternative diagrams drawn.

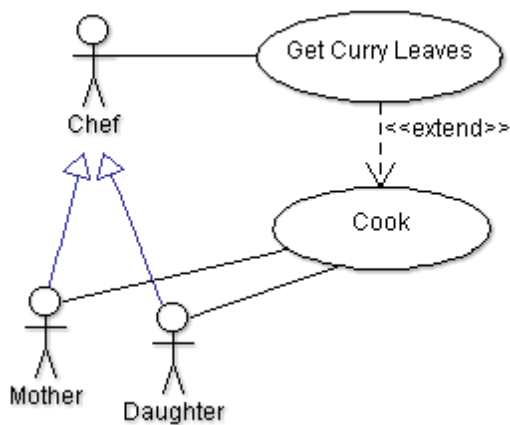
(i)



(ii)



(iii)

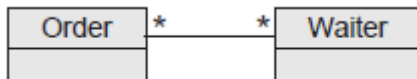


Which of the above diagrams is/are correct?

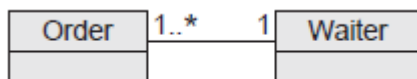
- (a) Only (i)
- (b) Only (ii)
- (c) Only (iii)
- (d) Only (i) and (ii)
- (e) Only (i) and (iii)

- 16) Consider the following scenario.
“An order is made with exactly one waiter, and he handles zero or more orders.”
Four students have modelled the above situation with UML2 *Class diagrams* as given below.

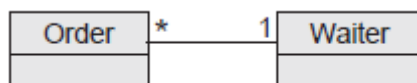
(i)



(ii)



(iii)



(iv)



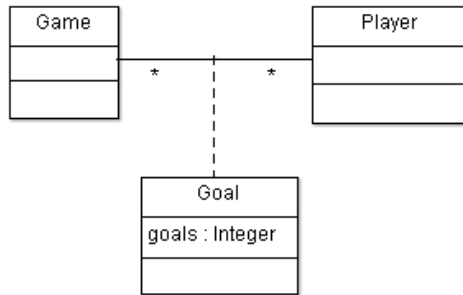
Which of the above diagrams is/are correct ?

- (a) Only (ii) (b) Only (iii) (c) Only (i) and (ii) (d) Only (ii) and (iii)
 (e) Only (i) and (iv)

- 17) During one soccer season, multiple players participate in multiple games. Each player scores in each game a certain number of goals.

Three class diagrams drawn for the above scenario are given below.

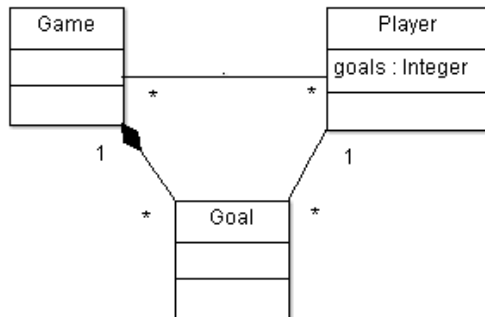
(i)



(ii)



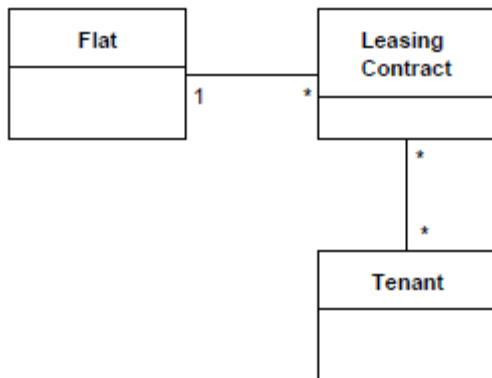
(iii)



Which of the above diagrams is/are correctly representing the scenario?

- (a) Only (i)
 (b) Only (ii)
 (c) Only (iii)
 (d) Only (i) and (ii)
 (e) Only (i) and (iii)

- 18) Consider the following Class diagram drawn for a following scenario.
Tenants need to sign a Leasing agreement with the owner when leasing a Flat. Owner has to maintain Flat details, Leasing Contract details and tenants details.



Which of the following is/are true about the above diagram?

- (a) If a tenant dies (i.e. the tenant-object is deleted), all leasing contracts of the tenant are deleted.
- (b) One tenant can rent the same flat a multiple number of times with different leasing contracts.
- (c) One flat can be rented by multiple tenants with different respective leasing contracts.
- (d) One flat can be rented by multiple tenants with the same leasing contract.
- (e) One flat can have one or more leasing contracts.

- 19) Some questions related to UML class diagrams with possible answers are given below.

- (i). Q. How do you represent the following multiplicity in UML 2?
'1 to 3 or 18 to many'
A. 1..3,18..*
- (ii). Q. What is a reflexive association in a class diagram?
A. When a class has an association to itself, then it is a reflexive association.
- (iii). Q. What is an *association class* in UML?
A. It is a class that contains an object which denotes an entity that controls interactions between a collection of objects.

Which of the above pairs is/are correct?

- (a) Only (i)
- (b) Only (ii)
- (c) Only (iii)
- (d) Only (i) and (ii)
- (e) All

- 20) Consider the following statements related to the given UML 2 class diagram.



- (i) *Order* objects can send messages to *Product* objects.
- (ii) *Product* objects can send messages to *Order* objects.
- (iii) An *Order* object stores a list of *Products* whereas a *Product* object does not store a list of *Orders*.

Which of the following is true about the above statements.

- (a) Only (i)
- (b) Only (i) and (ii)
- (c) Only (iii)
- (d) Only (i) and (iii)
- (e) All

21) Consider the following statements.

- (i) *Control* Classes process messages from an *interface* class and respond to them by sending and receiving messages from the *entity* classes.
- (ii) Use Case models are refined to reflect the implementation environment.
- (iii) Class interactions, behaviours and states are modelled to support the use case scenarios.

Which of the above tasks are related to Object Oriented Design?

- (a) Only (i)
- (b) Only (i) and (ii)
- (c) Only (i) and (iii)
- (d) Only (ii) and (iii)
- (e) All

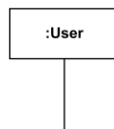
22)

Consider the following statements related to State diagrams.

- (a) The three key elements of *State diagrams* are states, events and transitions.
- (b) It shows the life history showing the different states of objects in a scenario.
- (c) Both actions and guards in *State diagrams* are behaviours of the object and they typically become operations.
- (d) It shows the events or messages that cause a transition from one state to another for a given object.
- (e) The following is an example where a behaviour in an activity, entry action or exit action sending an event to a different object called CourseRoster.
^CourseRoster.Create

23) Which of the following statements is/are correct with respect to UML *Sequence diagrams*?

- (a) Lifelines represent object instances that participate in the sequence being modelled.
- (b) The following is an anonymous lifeline of a class *User* in a *Sequence diagram*.



- (c) The focus of control in a sequence diagram is a small circle that will let one know which object has control at a particular point in time.
- (d) It is an interaction diagram which focuses on the message interchange between a number of lifelines.
- (e) They show a scenario in a time based order showing what happens first and what happens next.

- 24) Consider the following statements with respect to UML sequence diagrams.
- (i) A message in a sequence diagram represents a specific kind of communication between two lifelines in an interaction.
 - (ii) The following is an example for a synchronous message where sender waits for the receiver to return from executing the message.



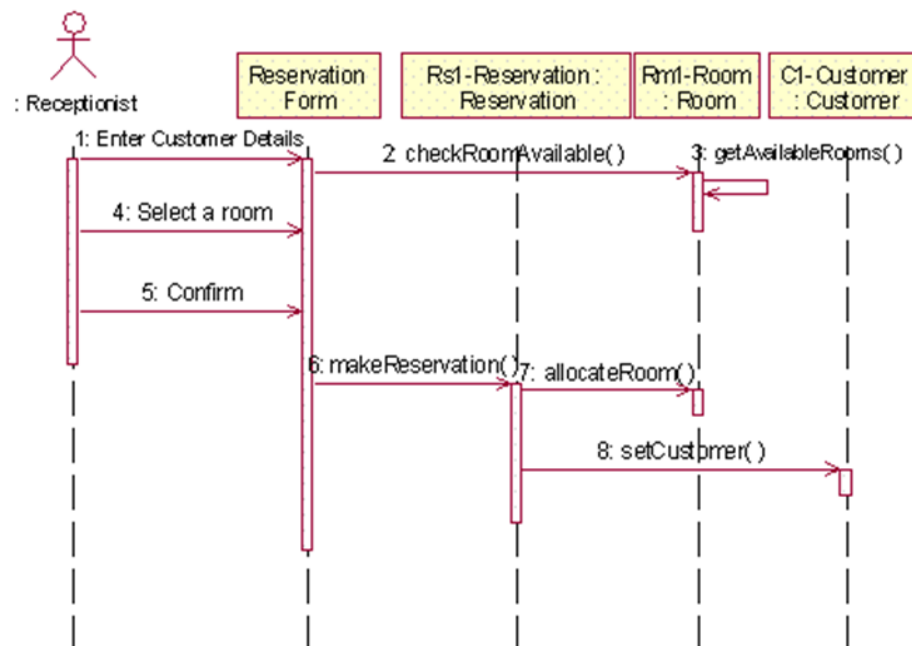
- (iii) The following is an example for a message return where receiver of an earlier message returns focus of control to the sender of that message.



Which of the above statements is/are correct?

- | | | |
|-------------------------|---------------|-----------------------|
| (a) Only (i) | (b) Only (ii) | (c) Only (i) and (ii) |
| (d) Only (ii) and (iii) | (e) All | |

Consider the following sequence diagram fraction drawn for the Make Reservation scenario of the Hotel Reservation System to answer **Q25 and Q26**.



25)

Identify from among the following the method(s) that must be implemented by the Reservation Class.

- | |
|--|
| (a) allocateRoom() and setCustomer() |
| (b) Rs1-Reservation and ReservationForm |
| (c) Only makeReservation() from the Make Reservation Scenario |
| (d) makeReservation() and checkRoomAvailable() |
| (e) Only allocateRoom() and setCustomer() from the Make Reservation Scenario |

- 26) Identify the problem domain classes whose objects are used in message interactions in the given sequence diagram.

- (a) Reservation Form
- (b) Reservation
- (c) Room
- (d) Customer
- (e) Receptionist

- 27) Which of the following statements is/are correct regarding UML Activity diagrams?

- (a) They do not clearly visualize the activities that can be done in parallel.
- (b) *Activity* diagrams are useful for communicating logic to programmers and however cannot be recommended to use them to communicate logic to non technical users.
- (c) The following is a *fork* symbol used to split a single activity flow into two concurrent activities.



- (d) The following flow final symbol shows the ending point of a process' flow.
- (e) *Activity diagrams* may be created to represent the flow across use cases or the flow within a particular use case or even to show the workflow of an operation.



- 28) Consider the following statements related to diagrams in UML2.0.

- (i) One of the differences between *timing diagram* and *sequence diagram* are that their axes are reversed so that the time is increased from left to right and the lifelines are shown in separate compartments arranged vertically.
- (ii) *Interaction overview diagram* is a variant of UML activity diagram that shows specifically the flow of interaction diagrams like sequence diagrams.
- (iii) *Deployment diagrams* show how elements of software and hardware are connected to one another.

Which of the above statement(s) is/are correct?

- (a) (i) Only
- (b) (ii) Only
- (c) (i) and (iii) Only
- (d) (ii) and (iii) Only
- (e) All

29)

Consider the following statements related to Executable UML.

- (i) Three key model types needed to create an executable subset of UML are domain models, class models and state models
- (ii) Executable UML supports model-driven architecture (MDA) through the specification of platform-independent models and the compilation of the platform-independent models into platform-specific models
- (iii) The number of model types used in executable UML has been reduced to two key model types.

- (a) Only (i)
- (b) Only (ii)
- (c) Only (i) and (ii)
- (d) Only (ii) and (iii)
- (e) All

30)

Which of the following statements is/are correct regarding Model Driven Engineering (MDE) ?

- (a) MDE is an approach to software development where models rather than programs are the principal outputs of the development process.
- (b) A Platform Independent Model (PIM) models the important domain abstractions used in the system and they are sometimes called domain models.
- (c) Platform Specific Models (PSM) are transformations of the platform independent model with a separate PSM for each application platform.
- (d) A Computation independent model (CIM) can be usually described using UML Models.
- (e) Several commercial tools are available that provide translators from PIMs to Common platform such as Java and J2EE.
