Object Oriented Analysis and Design: Assignment 6

Total Marks : 20

August 22, 2022

Question 1

Identify the correct statement(s) from the following. *Marks: 2* **MSQ**

a) An attribute is a behavioral feature of a class.

b) Methods are behavioral features of a class.

c) Abstract Class cannot be instantiated.

d) A class is a discrete entity with identity, state, and invocable behavior.

Answer: b), c)
Explanation: Attribute is a structural feature of a class..
An object is a discrete entity with identity, state, and invocable behavior while a class is a set of objects with state, and common behavior. So, options a) and d) are false.
Hence, options b) and c) are correct. An Abstract Class cannot be instantiated.

Question 2

A Student has a Roll_number, Name, Department, and an array of marks obtained in all subjects as attributes. We want to add an extra attribute total_marks in the Student class and the value of the total_marks is the sum of all marks obtained by the student in all subjects. The type of total_marks is int and it has protected visibility. Identify the correct representation for total_marks.

Marks: 2 **MCQ**

a) +total_marks: Integer

b) #total_marks: Integer

c) +/total_marks: Integer

d) #/total_marks: Integer

Answer: d)
Explanation: total_marks is a protected and derived attribute. According to the UML class diagram notation, option d) is correct.

Question 3

A class Date has a private array of 12 integers days_in_month, that keeps a count of number of days in a month for non-leap years. It is desired that this variable can only be accessed by a public get method from outside the class Date. The variable days_in_month is shared by all instances of class Date. The variable days_in_month is a constant as expected. What is the correct representation of the attribute days_in_month in UML class diagram?

Marks: 2 **MCQ**

a) +days_in_month: Integer[12]

b) +days_in_month: Integer[12] {readOnly}

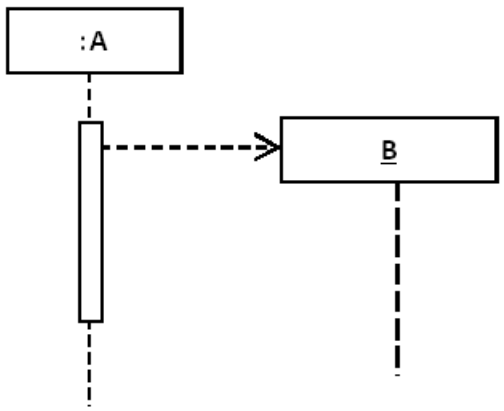
c) +days_in_month: Integer[12] {readOnly}

d) -days_in_month: Integer[12] {readOnly}

Answer: d)
Explanation: days_in_month is a private static integer array of size 12.
Hence, option d) is correct.

Question 4

Which of the following statement(s) is (are) incorrect about the following Sequence Diagram?



Marks: 2 **MCQ**

Identify the correct purpose of the message used in the above diagram.

a) The message from the A is lost.

b) This message is in response to some other message or some use case to the A has resulted in the instantiation of B.

c) The message is to send some asynchronous message to B.

d) The message is used to provide a reply from A to B.

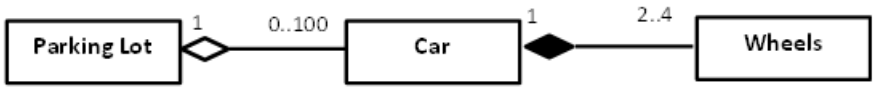
Answer: b)
Explanation: According to the UML sequence diagram notations, option (b) is correct.

Question 5

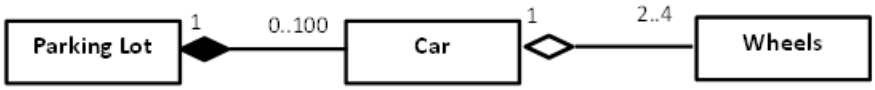
A car has exactly 2 to 4 wheels. A parking lot has zero to 100 cars. Identify the correct UML diagram that captures these two relationships among the three classes mentioned.

Marks: 2 **MCQ**

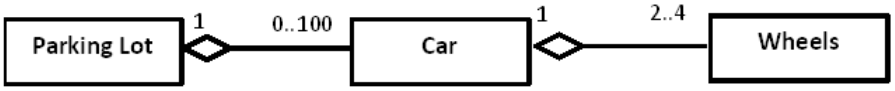
a)



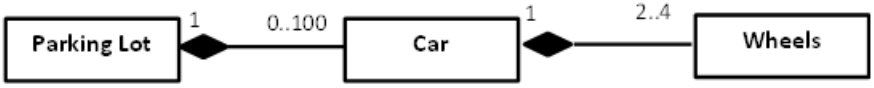
b)



c)



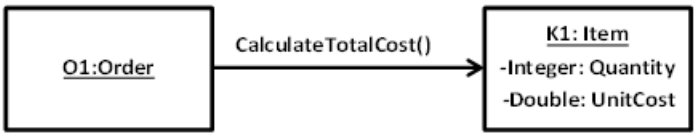
d)



Answer: a)
Explanation: Car and wheels is an example of strong aggregation while parking lot and car is an example of weak aggregation. Thus, option a) is correct.

Question 6

Consider a part of a sequence diagram.



Which of the following statements are true?

Marks: 2 **MSQ**

a) The method for the message CalculateTotalCost is defined in the class Order.

b) The method representing the response of the message CalculateTotalCost is defined in the class Item.

c) Some method in the class Order invokes a method corresponding to the message CalculateTotalCost on K1:Item.

d) Some method in the class Item invokes a method corresponding to the message CalculateTotalCost on O1:Order.

Answer: b), c)
Explanation: Messages are implemented in terms of methods. The receiver of a message has to respond to it. So, the required behaviour for responding to a message in defined in the class of the receiving object. The sender of a message invokes the corresponding method on the receiver.
Hence, options (b) and (c) are correct.

Question 7

Suppose, a Student object sends a message login(userName, password) to an ExaminationSystem object.
If the login is successful, the Student object sends a message
marks = checkMarks(rollNumber, subjectCode) to the ExaminationSystem object.
Then, if the student's marks is more than 50% then, the student object sends a message highestMarks = checkHighestMarks(subjectCode) to the ExaminationSystem object.

How may one capture the sending of the last two messages from Student to ExaminationSystem?

Marks: 2 **MCQ**

a) By putting the messages in nested alt interaction fragment.

b) By putting the second message in a ref interaction fragment.

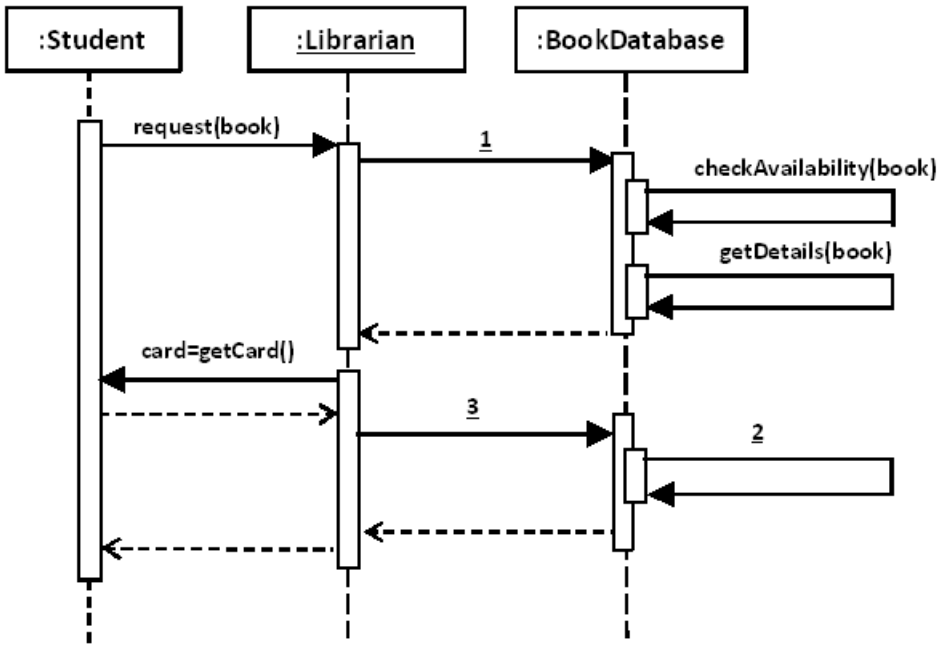
c) By inserting a guard condition [login = successful] in front of the message checkMarks(rollNumber, subjectCode).

d) By inserting a guard condition [marks¿50%] in front of the message checkHighestMarks(subjectCode).

Answer: a)
Explanation: Ref interaction fragment is used to reuse an already existing interaction diagram. So, option (b) is not correct.
The second message may be put in an alt fragment and the third message may be put in a nested alt fragment to mean the anding of conditions for the third message.
The guarding of second message will not help in sending conditional third message.
Even if we guard the last two messages as mentioned in options (c) and (d), the anding of conditions for the third message is not captured.
Hence, option (a) is correct.

Answer Questions 8 to 10 based on the following description and the given incomplete Sequence Diagram:

A student wants to issue a book from library. At first, the student requests the librarian for the book which he/she needs. The librarian searches the requested book in the database. The book database system searches the book availability and checks the details of the book. The database system returns the details of the book to the librarian. Then, the librarian requests the student to give library card. The students provide the library card and the librarian requestes the database to update the details about the card and the book into the database. In response, the database system enters the details about the card and the book and a receipt is generated to be returned to the librarian.



Question 8

Consider the previous passage and the incomplete Sequence Diagram. Which of the following best describes 1 as mentioned in the Sequence Diagram?

Marks: 2 **MCQ**

a) search()

b) search(book)

c) details = search(book)

d) checkAvailability()

Answer: c)
Explanation: According to the passage, the librarian sends a message to search for the book and gets the details of the book.
Hence, option (c) is correct.

Question 9

Consider the passage described just before Question 8 and the incomplete Sequence Diagram. Which of the following best describes 2 as mentioned in the Sequence Diagram?

Marks: 2 **MCQ**

a) updateDetails()

b) updateDetails(card)

c) updateDetails(book)

d) receipt = updateDetails(card, book)

Answer: d)
Explanation: According to the passage, the librarian sends a message to update the details for the book and the card and gets a receipt.
Hence, option(d) is correct.

Question 10

Consider the passage described just before Question 8 and the incomplete Sequence Diagram. Which of the following best describes 3 as mentioned in the Sequence Diagram?

Marks: 2 **MCQ**

a) enterDetails()

b) enterDetails(card)

c) receipt = enterDetails(card, book)

d) enterDetails(card, book)

Answer: c)
Explanation: According to the passage, after the librarian sends a message to update the details for the book and the card, the database enters the details of the card and the book and generates a receipt.
Hence, option (c) is correct.