Sri Lanka Institute of Information Technology

# B. Sc. Special Honours Degree/ Diploma
in
## Information Technology

Final Examination
Year 1, Semester 2 (2018)- June Batch

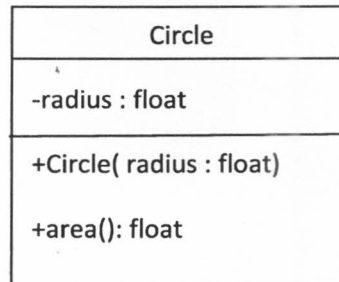# IT1050 – Object Oriented Concepts

Duration: 2 Hours

## Instructions to Candidates

- 10 minutes reading time is given before commencing to answer the questions.
- This paper has **Four** questions. Answer all questions
- Total Marks is 100.
- There are 7 pages with the cover page.

**Question 01** (40 marks)

a) Consider the following class.

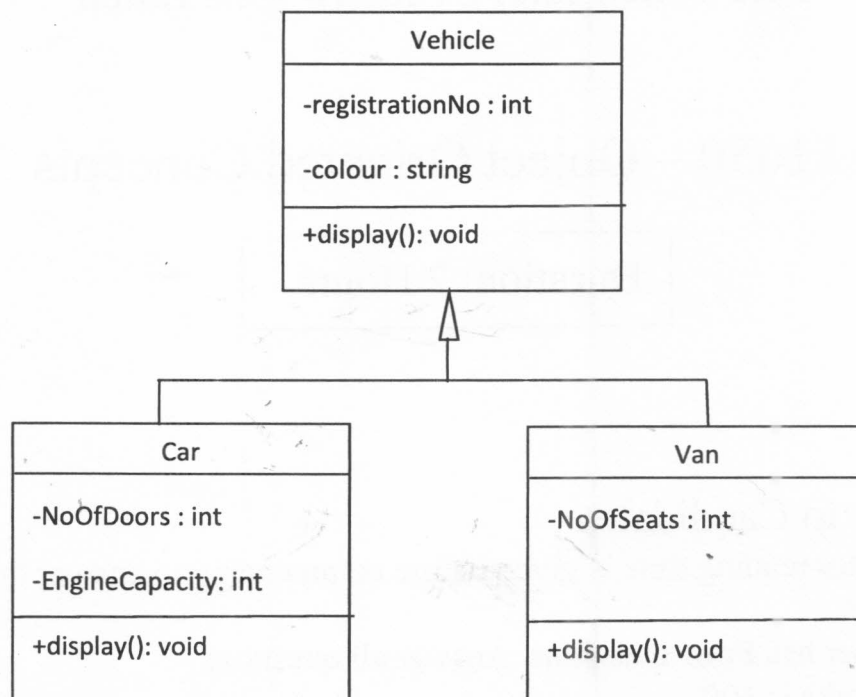| Circle |
| --- |
| -radius : float |
| +Circle( radius : float) |
| +area(): float |

i) Write the coding of the constructor for the "Circle" class. (2 marks)

ii) Write a C++ statement to create an object of the "Circle" class using dynamic memory allocation. ( Consider radius is 10 ). (2 marks)

iii) Call the method "area()"to calculate the area of the circle and print the result. (1 mark)

b) Consider the following class diagram. (5 marks)

| Vehicle |
| --- |
| -registrationNo : int |
| -colour : string |
| +display(): void |

| Car |
| --- |
| -NoOfDoors : int |
| -EngineCapacity: int |
| +display(): void |

| Van |
| --- |
| -NoOfSeats : int |
| +display(): void |

Write the C++ coding to implement the above classes. ( You are not required to implement the methods )
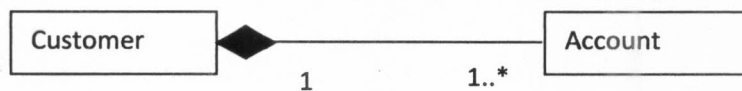
c) Explain the following terms briefly with an example.                    (6 marks)

        i) Abstract class

        ii) Virtual Function

        iii) Association class

d) List the relationships that can exists between classes from the strongest to the weakest. Give, an example for each.                    (6 marks)

e) Explain the following relationships in your own words     .                    (6 marks)

i)



ii)



ii)



f) Briefly explain "Polymorphism" using an example.                    (2 marks)

g) Draw separate UML class diagrams to link the classes in the following contexts using association, composition, aggregation, inheritance and multiplicity where appropriate.

(4 marks)

    i) A Zoo has lots of animals living in cages. The Zoo needs maintenance staff and a doctor. In addition to animal area, some Zoos also have play areas and common areas.

    ii) A cricketer can be a batsman, bowler or wicket keeper. There are some cricketers called all rounder who can bat and ball.

h) Consider the simple code segment given below.

```
class Order
{
    private:
        int orderNo;

    public :
        void addItem ( Item *i);
};
```

i) Identify two classes from the above coding. (2 marks)

ii) What is the most suitable relationship that can exit between those two classes? (2 marks)

iii) Show the relationship between two classes using UML notation. (2 marks)

**Question 02** (20 marks)

a) Write the 5 rules used for rejecting nouns in the "Noun-Verb" Analysis. (5 marks)

b) Consider the following scenario. Do the Noun Verb analysis to identify the classes in the description. Show clearly how the nouns were rejected using the above rules. (5 marks)

An Online bookshop sells different things. Currently it has books, magazines and CDs. All these products have some common types of information such as price, title etc.. Also each product may have specific information such as author, number of pages, artists, type etc.. ).

The registered customers can place orders for products. The ordered products are usually delivered together, but sometimes several shipments are needed when the store runs out of products for a while. An order may contain several products.

The products are delivered to personal customers and payments are done at the delivery. The business customers will get their orders directly, and they will be sent an invoice afterwards. Both customer types can make the payment also by using credit card. When registering, a customer is prompted to give contact and personal information needed for authentication, delivery of orders and invoicing.

The bookshop system must be able to add and remove customers, add new products and view/ update existing products, make or remove orders and view existing orders, view and generate reports on the products.

c) Consider the classes identified above and draw the CRC cards. (10 marks)

**Question 03** (20 marks)

Read the following description and identify the classes, attributes, methods and relationships between classes, multiplicity specification. Draw a UML class diagram for the following scenario using the above features.

The purpose of **savings account** is to allow us to save money. Account holder can make some limited number of deposits and withdrawals per month, while account provides no checks. A **checking account** is a bank account that uses checks as a way to withdraw or transfer money from the account - pay bills, buy items, transfer or loan money. Usually banks allow account holders to make withdrawals and deposits through automatic teller machines (ATM). **Basic checking** accounts, sometimes called **No frills** accounts, offer a limited set of services. They usually do not pay interest, have lower required minimum balance, may restrict writing and/or depositing more than a certain number of checks per month. **Checking accounts with interest** have higher required minimum balance but pay interest (based on the average balance maintained), and usually offer a better services, like allowing to write unlimited number of checks. These accounts are sometimes referred to as negotiable order of withdrawal (NOW) accounts.

**Money market** account or money market deposit account (MMDA) pays interest at a higher rate than the rate paid on savings or checking accounts with interest. Market accounts usually require a higher minimum balance for the account to start earning interest, as compared to checking or savings account. Fund withdrawals allowed per month are very limited.

**Certificates of deposit** (CDs) also known as **time deposits** are bank accounts that require the account holder to make a relatively large deposit and leave funds in the account for some agreed amount of time, usually several months or years. There is a penalty for early withdrawal of funds. Because of these restrictions, the interest paid on a CD is usually higher than the interest paid with other types of bank accounts.

There are two special accounts called **Children's Savings Account** and **Health Savings Account** (HSA). These two accounts are both **Personal Accounts** as well as **Savings Accounts**.

**Children's Savings Account** is a personal savings account that allows children to learn about money savings, interest rates and see what this means in relation to their savings. Some banks require some monthly fee or minimum balance and could charge fees, if an account is inactive or there are too many small deposits.

**Health Savings Account** (HSA) is a personal savings account that allows individuals covered by high-deductible health plans to receive tax-preferred treatment of money saved for future medical expenses.

## Question 04                                                                                    (20 marks)

Consider the following class diagram and write the coding for the classes shown in the diagram considering the relationship among them. You are not required to write any methods for the classes.

**Customer**
- -name : string
- -address: string
- -points :int
- +addPoints(): void

1 ................................ 0..*

**Order**
- -date : Date
- -status: string
- +calcTax():void
- +calcTotal(tax : double) : void

**Payment**
- #amount : double

1..*          1

**Credit**
- -number: int
- -type: char
- -expDate :Date
- +authorize(): void

**Cash**
- -cashTendered : double

**Check**
- -name : string
- -bankID: int
- +validate() : void

**Order Details**
- -quantity : int
- -taxStatus: string
- +calcSubTotal(): void
- +calcWeight(): void

1

1..*

0..*

1

**Item**
- -ShippingWeight: double
- -description: string
- +getPrice(): void
- +getweight():void