02689

Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 1, Semester 2 (2023)

IT1050–Object Oriented Concepts

Duration: 2 Hours

June 2023

Instructions to Candidates:

- This paper has 4 questions.
- Answer all other questions in the booklet given.
- The total marks for the paper is 100.
- This paper contains 7 pages, including the cover page.
- Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.
- This paper is preceded by 10 minutes reading period. The supervisor will indicate when answering may commence.

Question 01 (40 Marks)

Write the answers to the following questions.

a). Explain the following terms in OOP using an example
   i) Function overriding
   ii) Composition

(6 marks)

b) Briefly explain the term, "Base class" with an example. (4 marks)

c) Consider the code below and answer the questions.

```
class X
{
  private :
     Y *yArr[2];

  public:
     void addYs(Y *y1, Y *y2)
     {
         yArr[0] = y1;
         yArr[1] = y2;
     }
};
```

i) What is the relationship between class X and class Y according to the code?
(2 marks)

ii) Draw the UML diagram to show the relationship between class X and Class Y.
(3 marks)

d) Consider the code below and answer the questions.

```
#include <iostream>
using namespace std;

class Animal
{
   protected:
       char name[20];
   public:
       Animal();
       Animal ( char tname[])
       {
           strcpy(name, tname);
       }
       virtual void speak() =0;
```

```
    void song()
    {
        cout<<name << " 's song"<<endl;
        speak();
    }
};

int main()
{
    Animal a;
    a. song();
    return 0;
}
```

i) What is the output of the above code ? (3 marks)

ii) What type of a class is "Animal" ? (2 marks)

e) Consider the given below description.

The class Daughter and class Son are inherited from the class Parent. The class Granddaughter is inherited from class Son.

What will be the order of calling the constructors of the above classes when an object of granddaughter is created? (3 marks)

f) Consider the given below description.

"This scenario is based on Sales Recording System. The owner, Mr. Perera uses sales tracking system to maintain records of daily sales of the super market. The operator uses these records to find out the items with low quantities to makes new orders from the buyers of the products they sell. At the end of each day owner can generate reports on items sold during the day and about the new purchases done."

By using the rules for rejecting nouns in Noun/Verb Analysis, write 2 rejected nouns by giving the rules for your rejection.

(4 marks)

g) Consider the code below and answer the questions

```
int main()
{
    Car car1;
    strcpy(car1.brand, "BMW");
    strcpy(car1.model, "x5");
    car1.yearManufactured = 1999;

    cout<<car1.brand<<","<<car1.model<<","
     <<car1.yearManufactured<< endl;
    return 0;
}
```

i) Draw the UML diagram of class Car. (3 marks)

ii) Write the C++ coding for class Car. (You do not have to implement any method) (2 marks)

h). Consider the classes below and write the relationship that can exist between the given classes. Draw the correct UML notation to represent the relationship. Mention the multiplicity where necessary. (8 marks)

i) Face, Eye

ii) Student, Student Committee

iii) Bird, Parrot

iv) Teacher, Course

Question 02 (25 marks)

Given below is a set of requirements for a bank. Analyse the given requirements and answer the questions.

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.

a) List the five rejecting rules and write all the nouns in the above description that will be eliminated under each rule. (10 marks)

b) Identify and list the classes in the above scenario. (5 marks)

c) Draw the CRC cards for any 5 classes you have identified in part b). (10 marks)

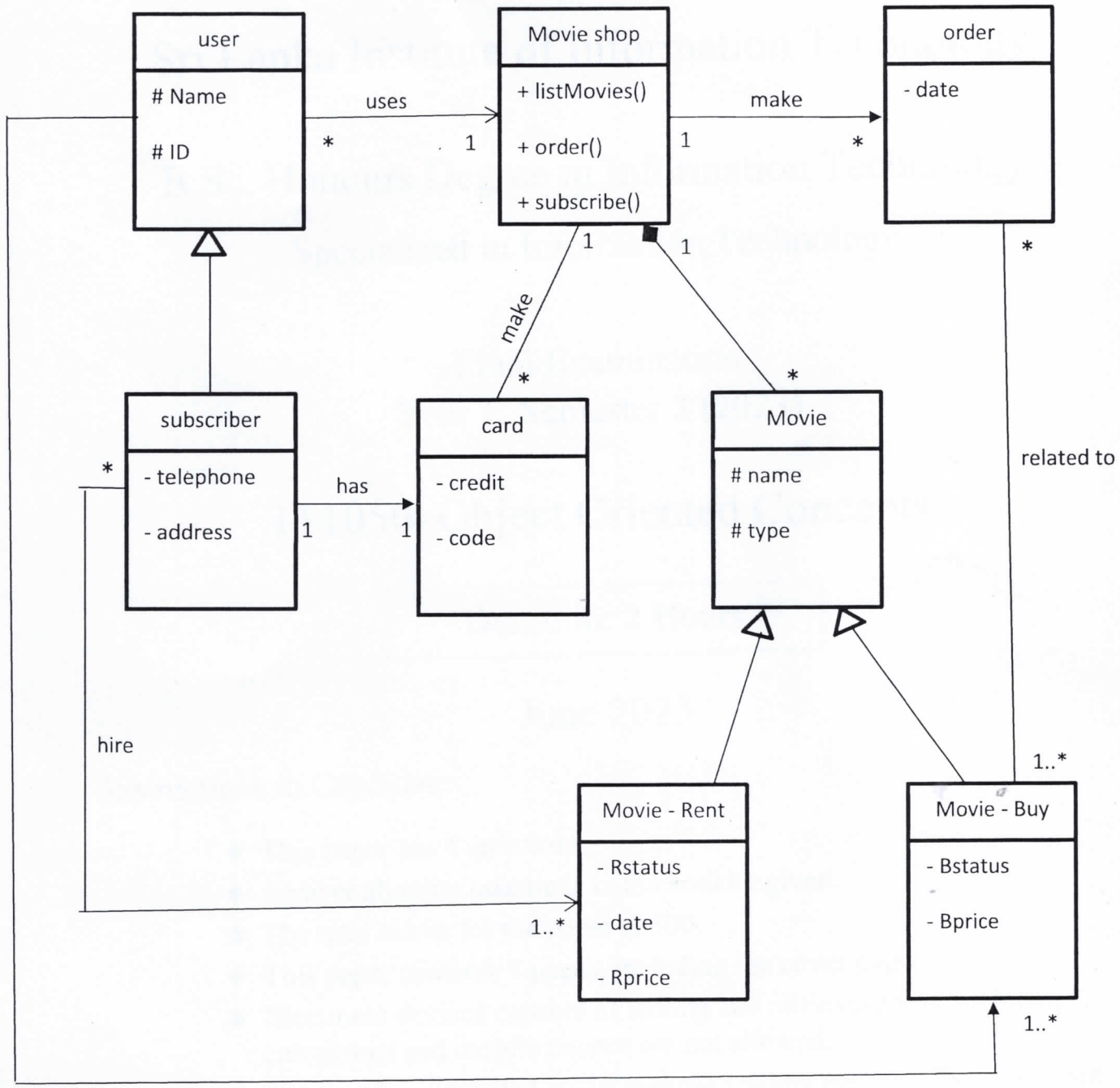
Question 03 (15 marks)

Consider the following description and draw the class diagram. Clearly show the classes, relationships and multiplicity using UML notations.

A hockey league is made up of at least four hockey teams. Each hockey team is composed of six to twelve players, and one player captains the team. A team has a name and a record. Players have a number and a position. Hockey teams play games against each other. Each game has a score and a location. Teams are sometimes led by a coach. A coach has a level of accreditation and a number of years of experience, and can coach multiple teams. Coaches and players are people, and people have names and addresses.

Question 04 (20 marks)

Consider the following class diagram and write the C++ code for the classes shown in the diagram. (Add methods with implementations ONLY when you need to show the relationships)



End of Paper