



**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
SEPTEMBER 2014 SESSION**

SUBJECT CODE	:	FSB23804
SUBJECT TITLE	:	OBJECT ORIENTED PROGRAMMING & DATA STRUCTURE
LEVEL	:	BACHELOR
TIME / DURATION	:	9.00 AM – 12.00 PM (3 HOURS)
DATE	:	8 JANUARY 2015

INSTRUCTIONS TO CANDIDATES

- 1. Please read the instructions given in the question paper CAREFULLY.**
 - 2. This question paper is printed on both sides of the paper.**
 - 3. Please write your answers on the answer booklet provided.**
 - 4. Answer should be written in blue or black ink except for sketching, graphic and illustration.**
 - 5. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer two (2) questions only.**
 - 6. Answer all questions in English.**
-

THERE ARE 9 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)**INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

- (a) Identify all the steps of the **software development phase**.
(4 marks)
- (b) Describe the **Analysis** step of the **development phase of software life cycle**.
(2 marks)
- (c) **Inheritance** and **polymorphism** are the processes that characterize Object Oriented Programming (OOP). **Define** the both terms.
(4 marks)

Question 2

Given the following class:

```
using System;
namespace ConsoleApplication1
{
    class Shape
    {
        protected double length;
        protected double width;

        public Shape(double l, double w)
        {
            length = l;
            width = w;
        }

        public double setLength(double length)
        {
            return length;
        }
        public double setWidth(double width)
        {
            return width;
        }
    }
}
```

```

    public double GetArea()
    {
        return length * width;
    }

    public void Display()
    {
        Console.WriteLine("Length: {0}", length);
        Console.WriteLine("Width: {0}", width);
        Console.WriteLine("Area: {0}", GetArea());
    }
} //end class Shape

class Rectangle : Shape
{
    public Rectangle(double l, double w) : base(l, w)
    {
    }
    public double GetPrice()
    {
        double price;
        price = GetArea() * 1.50;
        return price;
    }
    public void Display()
    {
        base.display();
        Console.WriteLine("Price: {0}", GetPrice());
    }
} //end class Rectangle
}

```

- (a) Illustrate the above classes' relationship using **Unified Modeling Language (UML)**.
(4 marks)
- (b) Based on the code segment given below, give the output of the program.

```

static void Main(string[] args)
{
    Rectangle r = new Rectangle(25.0, 5.5);
    r.Display();
    Console.ReadLine();
}

```

- (2 marks)
- (c) Modify the code in **Main** so that the program will prompt user to enter the value of the length and width.
(4 marks)

Question 3

Given in Figure 1 the UML design of the classes Shape, Rectangle and Triangle:

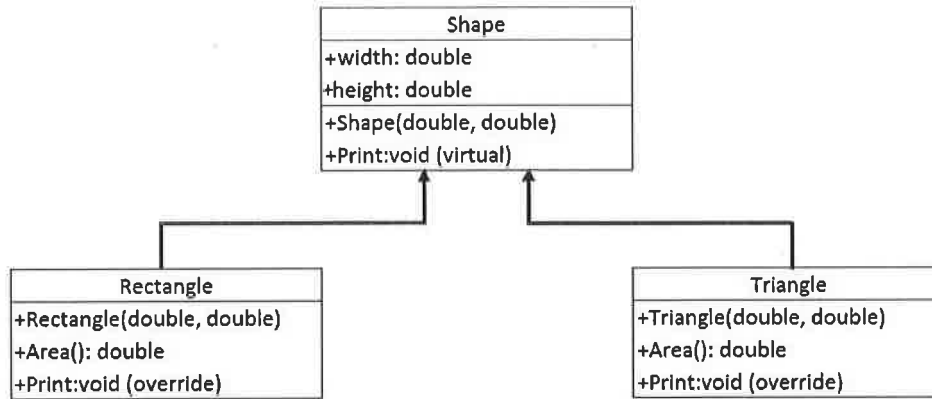


Figure 1: UML design of Shape, Rectangle and Triangle

(a) If the class **Shape** is given as following:

```

class Shape
{
    private double width, height;
    public Shape(double a = 0.0, double b = 0.0)
    {
        width = a;
        height = b;
    }
    public virtual void Print()
    {
        Console.WriteLine("Parent class area : {0}",
            width*height);
    }
}
    
```

Write a complete definition for the classes **Rectangle** and **Triangle**.

(8 marks)

(b) Based on the code segment given below, give the output of the program.

```

static void Main(string[] args)
{
    Rectangle r = new Rectangle(10.5, 7);
    Triangle t = new Triangle(10, 5.5);
    r.Print();
    t.Print();
    Console.ReadKey();
}
    
```

(2 marks)

Question 4

Given the declaration of a linked list:

```
LinkedList<string> mylist = new LinkedList<string>();
```

(a) Write a segment of code to create the linked list shown in Figure 2:

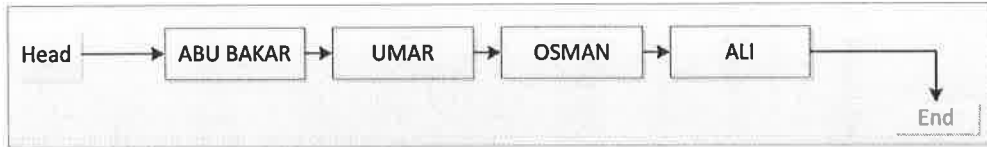


Figure 2: linked list

(3 marks)

(b) Find the node that contains the word “ALI” and put it in a new created LinkedListNode named myNode.

(1 mark)

(c) Insert a new node which contains the word “MUAWIYAH” after myNode.

(1 mark)

(d) Check the existence of the node that contains the word “UMAR”. If it exists, make head points to it.

(5 marks)

SECTION B (Total: 60 marks)**INSTRUCTION: Answer only TWO questions.****Please use the answer booklet provided.****Question 5**

Given the following class:

```
class Circle
{
    private int radius;

    public Circle(int rad)
    {
        radius = rad;
    }

    public double GetArea()
    {
        return 3.142 * radius * radius;
    }

    public double GetCircumference()
    {
        return 2 * 3.142 * radius;
    }

    public void Print()
    {
        Console.WriteLine("The circle area is equal to " +
            GetArea());
        Console.WriteLine("The circle circumference is equal
            to " + GetCircumference());
    }
}
```

- (a) Give the output of the code below by evaluating the object c of the class Circle.

```
Circle c = new Circle(10);
c.Print();
```

(5 marks)

- (b) Given the following information:

“Cylinder inherits Circle”

According to the information above, write the header of the class Cylinder.

(1 mark)

- (c) Write the constructor of the class Cylinder that contains **two integer variables** which are used to initialize the **radius** and the **length** of a cylinder.

(4 marks)

- (d) Create a new method for the class Cylinder called GetVolume(). This method is used to calculate the volume of a cylinder which is equal to the area of its circle multiply by its length ($\pi r^2 l$).

(4 marks)

- (e) Cylinder needs to overwrite the method GetArea() and Print() existing in Circle. Write the new headers of both methods in **base class** and **derived class**.

(4 marks)

- (f) Write the definition of both overwritten methods in (e) using the following information:
- The method GetArea() in Cylinder is used to calculate the area of a cylinder which is equal to the circumference of its circle multiply by its length ($2\pi r l$).
 - The method Print() in Cylinder displays its area and its volume.

(5 marks)

- (g) Give the output of the following code:

```
Circle c2 = new Circle(5);
Cylinder cyl = new Cylinder(6, 8);
c2.Print();
cyl.Print();
```

(7 marks)

Question 6

Given the following class:

```
class Lecturer
{
    private string name;
    private string id;

    public Lecturer(string name, string id)
    {
        this.name = name;
        this.id = id;
    }

    public string GetName()
    {
        return name;
    }

    public string GetID()
    {
        return id;
    }
}
```

- (a) A lecturer's room can be described by three things which are the lecturer who owns the room, its number and its floor. **Write the body (ONLY)** of a class Room which is based on the following information:
- It has three class instance variables which are lect (Lecturer), roomNo (string) and floor (int).
 - It has a constructor with three parameters which are used to instantiate the object of the class Room.
 - It has a method called ChangeLecturer which has a parameter of the type Lecturer. This parameter indicates the new lecturer who owns the room.
 - It has another method called Print which is used to display all the information of a Room.
- (10 marks)
- (b) Write the code of the constructor defined in (a). (6 marks)
- (c) Write the code of the method ChangeLecturer defined in (a). (4 marks)
- (d) Write the code of the method Print defined in (a). (3 marks)

(e) Give the output of the following code:

```
Lecturer l1 = new Lecturer("Mr Sobri", "L123456");  
Lecturer l2 = new Lecturer("Mr Razif", "L654321");  
Room r = new Room(l1, "E338", 3);  
r.Print();  
r.ChangeLecturer(l2);  
r.Print();
```

(7 marks)

Question 7

(a) Consider the *list* given in Figure 3 with the *length* = 10.

	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
list	4	19	23	51	56	70	71	77	90	99

Figure 3: List of 10 integers

Suppose that we want to determine if 56 is in the *list*. Briefly explain the algorithm used by the following methods to get the final answer:

- i. Sequential search. (7 marks)
- ii. Binary search. (7 marks)

(b) Given the following list:

	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	16	30	24	7	62	45	5	55

Figure 4: List of 8 integers

Briefly explain the concept of sorting by sketching the initial unsorted list in Figure 4 towards getting the sorted list using the following methods:

- i. Selection sort (8 marks)
- ii. Insertion sort. (8 marks)

END OF QUESTION