UNIVERSITI TEKNOLOGI MARA
FINAL EXAMINATION

COURSE	:	**OBJECT ORIENTED PROGRAMMING**
COURSE CODE	:	**CSC186**
EXAMINATION	:	**FEBRUARY 2023**
TIME	:	**3 HOURS**

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of two (2) parts: PART A (15 Questions) PART B (4 Questions)
2. Answer ALL questions from two (2) parts in the Answer Booklet. Start each answer on a new page.
3. Do not bring any material into the examination room unless permission is given by the invigilator.
4. Please check to make sure that this examination pack consists of:
   i. the Question Paper
   ii. an Answer Booklet – provided by the Faculty
5. Answer ALL questions in English.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of 14 printed pages

PART A

QUESTION 1

Which of the following statements regarding an array is **FALSE**?

A Array can be initialized when they are declared.
B An array is allowed to contain duplicate values.
C An array expands automatically when it is full.
D An array uses a zero index to reference the first element.

(2 marks)

QUESTION 2

A composite object is_____.

A an attribute inherited from other class
B a method from other class defined in a class
C an attribute declared as a static modifier
D an object from a class declared as private attribute in another class

(2 marks)

QUESTION 3

Find the output for the given code fragment?

```
int [ ] a = new int [5];
a[0] = 8;
a[1] = 2;
a[2] = 6;
System.out.print(a[0] + a[2] + a[4]);
```

A 8 2 0
B 8 2 6
C 16
D 14

(2 marks)

QUESTION 4

Which of the following statements is **FALSE**?

A `Student c[ ] = Student [6] new;`
B `House c[ ] = new House[6];`
C `Computer[ ] c = new Computer[6];`
D
```
int c[ ];
c = new int[6];
```

(2 marks)

QUESTION 5

Which of the following is the **CORRECT** method header to initialize object in the program segment below:

```
public class CarApp{
   public static void main(String[] args){
        Car c1 = new Car("X50", "silver");
        Car c2 = new Car(c1);
   …..}
  }
```

A `public void Car(String model, String color)`

B `public Car(String model, char color)`

C `public Car(Car c)`

D `public Car(String model)`

(2 marks)

QUESTION 6

Observe the following program segment:

```
Staff[ ] s = new Staff[10];
s[0] = new Staff();
…..
if (s[5].getName().equalsIgnoreCase("Iqmal") )
…..
```

Which of the following statements **DOES NOT** describe the above Java program?

A The program uses array of objects.

B The array stores up to 10 objects.

C The program tries to check whether the fifth object's name is Iqmal.

D The above program is written in the class application.

(2 marks)

QUESTION 7

Inheritance in Java is_____type of relationship.

A association

B is-A

C has-A

D uses-A

(2 marks)

QUESTION 8

Which of the following is an advantage to apply inheritance?

A Class Extendibility.
B Code Reusability.
C Save development time.
D All of above.

(2 marks)

QUESTION 9

What is the keyword used to inherit a class?

A `instanceof`
B `private`
C `extends`
D `super`

(2 marks)

QUESTION 10

Which of the following method cannot be inherited from a super class?

i. Constructor
ii. Final method
iii. Private method
iv. Public method

A i & ii
B i & iii
C ii & iii
D ii & iv

(2 marks)

QUESTION 11

What is the output of the following Java program?

```
class One
{
…..
          void aa()
          { System.out.print("Yes "); }
}
```

```
class Two extends One
{
…..
        void aa()
        {
              super.aa();
              System.out.print("No ");
        }
}
```

```
public class JavaInheritance
{
public static void main(String[] args)
      {
              …..
              Two t = new Two();
              t.aa();
        }
}
```

A Yes No
B No Yes
C Yes Yes
D No No

(2 marks)

QUESTION 12

Which of the following statements describes polymorphism?

A The ability for a method to be processed in only 1 form.
B The ability for many methods to be processed in one way.
C The ability to define more than one method with the same name.
D The ability for undefined method to be processed in at least one way.

(2 marks)

QUESTION 13

How does Java implement polymorphism?

i. Final Class
ii. Overloading
iii. Overriding
iv. Abstract method

A i & ii
B i, ii & iii

C ii, iii & iv
D i, iii & iv

(2 marks)

QUESTION 14

Abstract class is_____.

A created using abstract keyword.
B contains abstract method
C needs to be inherited to be used
D all of above

(2 marks)

QUESTION 15

The following code segment is an example of a(n)_____.

```
public double findArea()

    { return pie*pow(radius, 2); }

public double findArea()

    { return width * length;  }
```

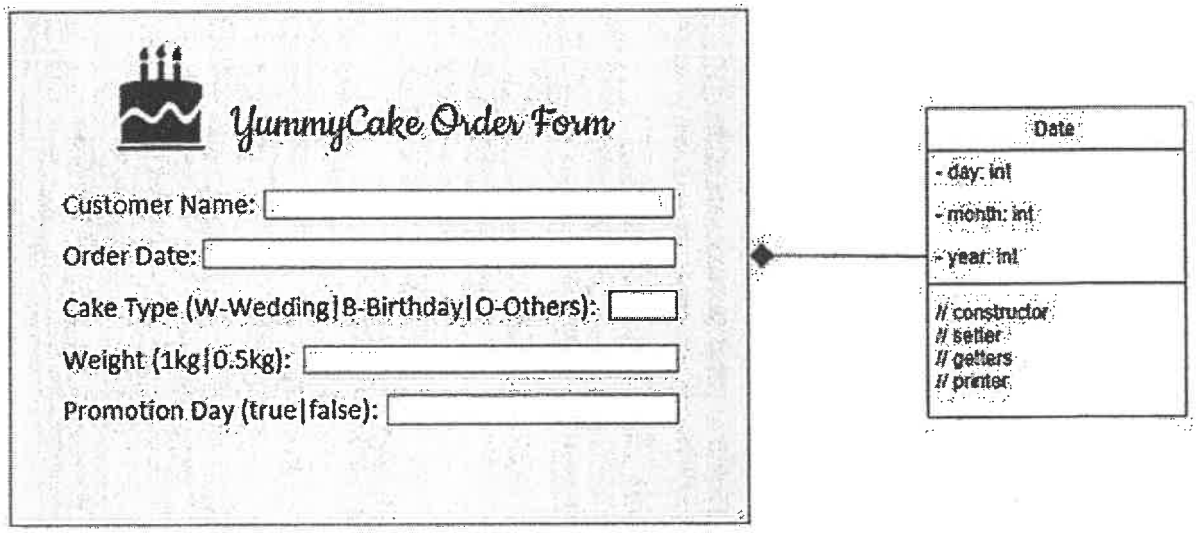
A polymorphism
B overloaded method
C overrriding method
D inheritance

(2 marks)

PART B

QUESTION 1

The following diagram shows a sample of an online order form owned by a local bakery shop. Order date is important data for owner to avoid their customers having a long waiting time to receive the cake. This also shows the efficiency of their business. To apply object- oriented approach to the application, developer decided to relate class `Date` with the form as follows.



Calculation of cake price is based on cake type and weight. The table below shows the details of cake price.

Cake Type	Weight (kg)	Price (RM)
W	1	300
	0.5	190
B	1	200
	0.5	130
O	1	100
	0.5	70

**Any purchase made during promotion day is entitled to a 25% cut-off.*

Based on the above information, answer the following questions.

a) Write the definition for class `OrderCake` that contains the following methods. Assume that the class `Date` has been defined.

i) A normal constructor.

(2 marks)

ii) A mutator method for all data members.

(2 marks)

iii) Accessor methods for each data member.

(2 marks)

iv) Processor method named `calcCharge( )` to calculate the price of cake ordered.

(4 marks)

v) Processor method named `compareCakeOrdered(OrderCake cake)` that compares the price of two cakes ordered. It returns true if the first cake is more expensive than the second cake and returns false otherwise.

(2 marks)

b) In the class application, write the following tasks:

- Instantiate **TWO (2)** `OrderCake` objects and assign the data to the objects.
- Determine whether the first or second order is more expensive. Display the details of the cake with a higher price.

(5 marks)

(17 marks)

QUESTION 2

a) What is single inheritance?

(1 mark)

b) Draw an inheritance hierarchy for the following classes.

Rabbit, Persian Cat, Animal, Siamese Cat, Cat

(4 marks)

c) Distinguish two differences between `super()` and `super.display()`.

(4 marks)

d) Explain about superclass.

(1 mark)

(10 marks)

QUESTION 3

Tabata Transport is a rental service company that provides variety of transport for customer to rent. One of the popular rental services is car rental. Given the following `CarRental` subclass inherited from `RentalService` superclass:

Superclass: `RentalService`

Attributes:

```
protected String custICNo; //customer's IC number

protected String custName; //customer's name

protected String custPhoneNo; //customer's phone number

//normal constructor, mutator, accessor methods, toString()
```

Subclass: `CarRental`

Attributes:

```
private double period; //rental period in hours

private boolean driver; //true if customer needs driver

//normal constructor, mutator, accessor methods, processor, toString()
```

Details of the charges are shown in the table below:

Rental Period (in hours)	Charges (RM)
Up to 6 hours	185.00
Up to 12 hours	230.00
Up to 24 hours	285.00
After the first 24 hours	RM25 per hours

After the first 24 hours, rental charges are calculated for the additional period. For each additional hour, the customer will need to pay RM25 per hour. In addition, there is a RM150 extra charge if the customer needs a driver.

Based on the above information, answer the following questions;

a) Write the normal constructor for the superclass and its subclass.

(5 marks)

b) Write the `toString()` method for the superclass and subclass.

(4 marks)

c) Write a method named `calcCharge()` to calculate and return the total charges for `CarRental` class.

(4.5 marks)

d) In the class application, write Java program statements to perform the following tasks:

i) Declare an array to store **TEN (10)** `CarRental` objects.

(1 mark)

ii) Read and store all data into the objects.

(3.5 marks)

iii) Calculate and display the total amount of car rental.

(2 marks)

iv) Display all customers' names who rented cars with the driver option.

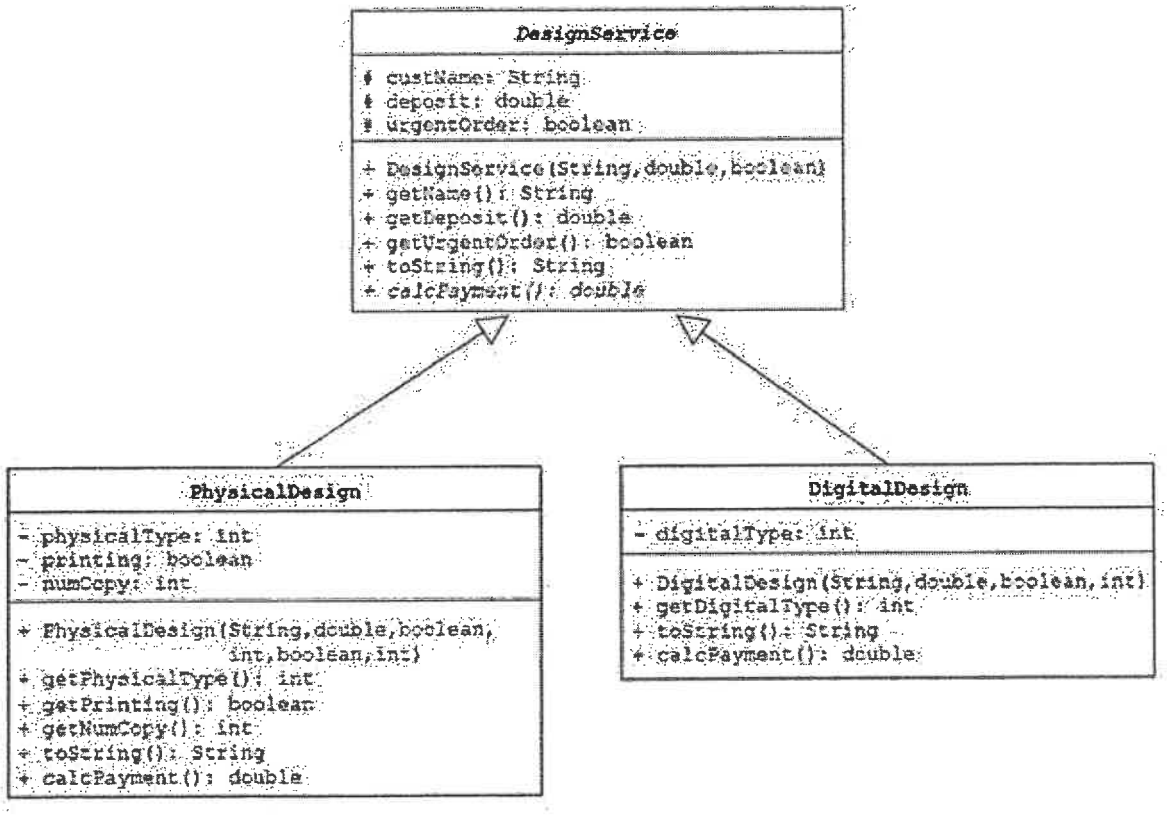
(2 marks)

(22 marks)

QUESTION 4

Futura Design is a company that provides design services for digital products (websites or advertisements) and physical printed products (banners, brochures, posters, and business cards). This company will deliver the product ordered by the customer within 14 working days. However, the company will accept the urgent order and deliver the product within 3 working days, with an additional charge of RM 50.00 per order. The company requires a deposit of a minimum of RM 30.00 for each order placed by the customer.

Given the UML class diagram for the design service application that has an abstract class named `DesignService` that has an abstract method named `calcPayment()`. There are two subclasses named `PhysicalDesign` and `DigitalDesign`.



`PhysicalDesign` class contains the attributes as follows:

- `physicalType`: represents the physical design type:1-banner, 2-brochure, 3-poster, and 4-business card
- `printing`: represents whether the customer requires the printing service or not.
- `numCopy`: represents the number of copies if the customer needs the printing service.

`DigitalDesign` class contains the following attribute.

- `digitalType`: represents the type of digital design: 1-website and 2-advertisement.

Based on the above class diagram, answer the following questions:

a) Explain the meaning of symbol # and – in the UML class diagram? What is the difference between the two symbols?

(3 marks)

b) Distinguish two features of abstract class and non-abstract class.

(2 marks)

c) Write Java program segments for the following methods:

i) A normal constructor for subclass `PhysicalDesign`.

(3 marks)

ii) Write the definition of method `calcPayment()` for `PhysicalDesign` class that calculates and returns the payment to be paid by customer. The calculation for payment is as follows.

- The payment of physical design product is calculated according to the type of physical design as shown in table below. If the customer requires printing service, additional charge for each piece is added.

Type	Charge (RM)	Additional Charge per piece (RM)
1 - Banner	250.00	40.00
2 - Brochure	250.00	10.00
3 - Poster	150.00	35.00
4 - Business Card	100.00	3.00

- An additional RM 50.00 is added to the payment if customer make urgent order. Then, the total payment is deducted from the deposit made by customer.

(7 marks)

d) Assume the data of the design service order is already stored into the array of objects declared as below:

```
DesignService ds[]=new DesignService[numOrder];

//numOrder is input by user
```

Write Java statements for the following tasks:

i) Display the details of physical design order together with the payment.

(2 marks)

ii) Count and display the number of urgent orders for website design.

(4 marks)

(21 marks)

END OF QUESTION PAPER