UNIVERSITI TEKNOLOGI MARA
FINAL EXAMINATION

COURSE	**:**	**OBJECT ORIENTED PROGRAMMING**
COURSE CODE	**:**	**CSC186**
EXAMINATION	**:**	**FEBRUARY 2022**
TIME	**:**	**3 HOURS**

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of FOUR (4) questions.
2. Answer ALL questions in English. Start each answer on a new page.
3. Answer must be handwritten. Scan and save the answer paper in ONE file only.
4. Upload the file at the specified platform.
5. You are strictly prohibited to discuss/share/disseminate the questions and answers amongst your classmates/coursemates. If found guilty or committed to one of the actions, you will be penalised.

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

This examination paper consists of 9 printed pages

QUESTION 1

Consider the following class definition and a text file named `FullTimeEmployee` and `employee.txt` respectively.

Class : `FullTimeEmployee`

Attributes :

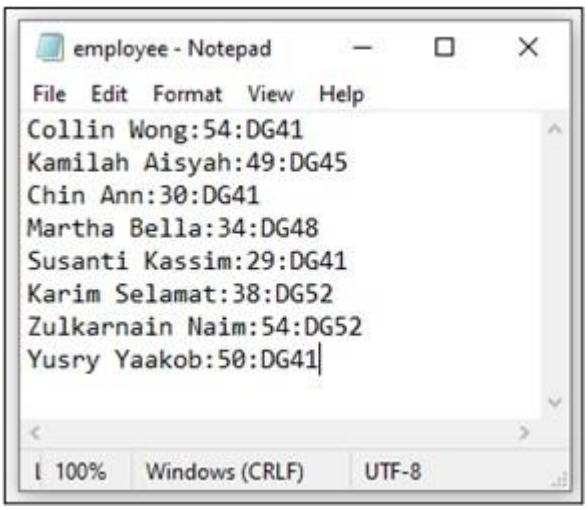
```
private String name;
private int age;
private String grade; //DG41, DG45, DG52 etc
```

Methods :
//default constructor
//a setter
//getters

```
public double determineSalary()
```

Grade	Salary
DG41	3000.00
DG45	5000.00
Others	7000.00

//printer method



Based on the above information that related to text file, answer the following questions.

a) Explain the purpose of the following predefined classes in a Java program and write a Java statement to create object for each class.

i. `FileReader`
ii. `StringTokenizer`

(4 marks)

b) Give one advantage of using text file, `employee.txt`.

(1 mark)

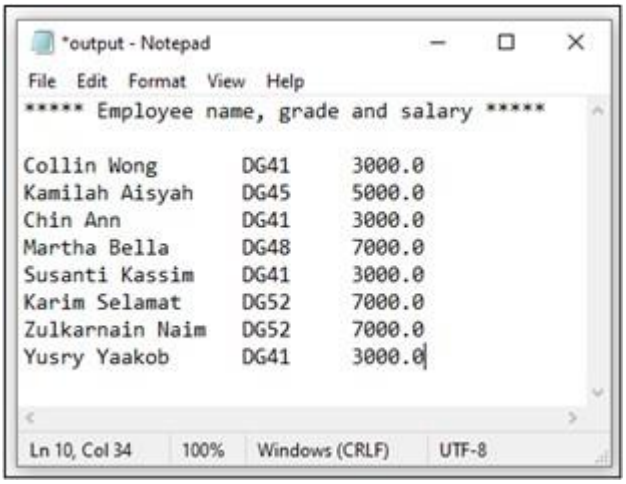
c) Write Java program segments to perform the following tasks.

i. Read all records from file employee.txt and store them into a `FullTimeEmployee` array. Complete the code at line marked `*** a ***`.

```
FullTimeEmployee[] e = new FullTimeEmployee[8];
int i=0, age;
String name, grade;
while((strLine =br.readLine())!= null)
{
          *** a ***
       e[i].setFullTimeEmployee(name, age, grade);
       i=i+1;
}
```

(2 marks)

ii. Determine the salary of each employee. Store employee name, grade and salary into an output file named `output.txt` as depicted below.



Complete the code at lines marked `*** b1 ***` and `*** b2 ***`.

```
PrintWriter pw = new PrintWriter(new BufferedWriter(new
FileWriter("E:\\output.txt")));
int i;
            *** b1 ***
for (i=0;i<e.length;i++)
{
            *** b2 ***
}
```

(2 marks)

iii. Write any **ONE** of catch blocks to handle exceptions that might occur.

(1 mark)

QUESTION 2

a) What is inheritance?

(1 mark)

b) List and explain TWO (2) advantages of inheritance.

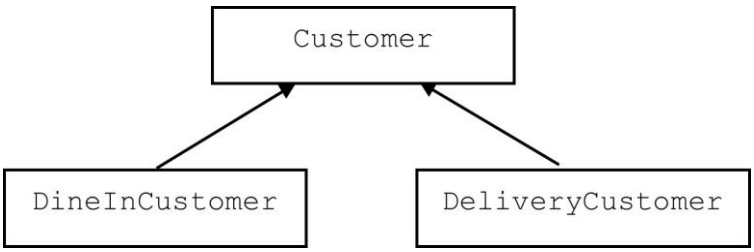
(4 marks)

c) Give one example of inheritance by giving one superclass and two subclasses. Write class header for the subclasses.

(5 marks)

QUESTION 3

Makette Steamboat & Grill is a popular restaurant in Kelantan which allows customers to dine-in or request for a delivery service. For a delivery service, customers can only choose one package to retain the freshness of food. Meanwhile, for dine in service, customers can choose up to two packages. Below are relationship and information of `Customer`, `DineInCustomer` and `DeliveryCustomer` classes.



Superclass: `Customer`

Attribute:
```
protected String customerName;
private char packageMenu; //A – combo1, B – combo2, C – combo3, D - none
```

Methods: constructor, accessor, `toString()`

Subclass: `DineInCustomer`

Attribute:
```
private int numOfAdult; //number of adult (age >12 years)
private int numOfChild; //number of child (6 to 12 years)
private char otherPackage;
```

Methods: constructor, accessor, `toString()`

Subclass: `DeliveryCustomer`

Attribute:
```
private String address;
```

Methods: constructor, accessor, `toString()`
```
public double calculatePrice(double km)
{ ….. }
```


a) Write Java program segments for the following methods.

i. A normal constructor for `Customer` and `DineInCustomer`.

(3 marks)

ii. A processor method in `DeliveryCustomer` class named `calculatePrice(double km)` that receives distance in kilometre, calculates and returns the total price to be paid by the customer. The delivery charge is calculated based on the distance. The details of calculation are as follows.

Package Menu	Price (RM)
A	100.00
B	150.00
C	200.00

Delivery charge is RM10.00 if the distance is more than 15 kilometers. No charge for otherwise.

(3 marks)

b) In the main application, write program segments that perform the following tasks:

i. Declare an array named `dine` to store 50 dine-in information and another array named `deliver` to store 50 delivery information.

(2 mark)

ii. Create an object for the first dine-in information and store it in the first location of `dine` array. Assume the data were successfully entered by the user.

(2 mark)

iii. List all information and the total number of dine-in customers.

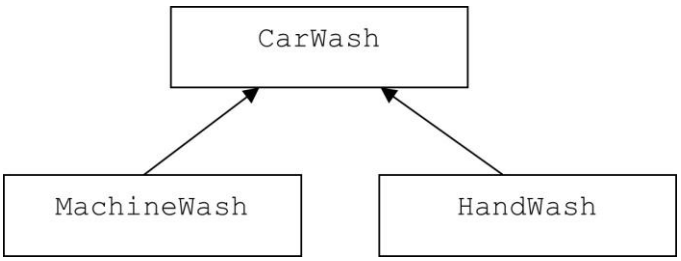
(3 marks)

iv. Calculate and display the total price of all delivery customers. The distance is entered by the user.

(2 marks)

QUESTION 4

SparkleShine Enterprise is a newly opening car wash in Johor Bahru. It offers two (2) types of services which are machine wash and hand wash. Given the following classes and inheritance hierarchy that show the relationships.



The following are definitions for the `CarWash, MachineWash` and `HandWash` classes.

```
public abstract class CarWash
{
    private String custName;            //customer's name
    private String plateNum;            //car plate number
    private String carType;             //type of car: Sedan or MPV

    public CarWash() {…}                //default constructor
    public void setCarWash(…){…}        //a mutator to initialize all attributes
    public String getCustName() {…}     //return customer name
    public String getPlateNum() {…}     //return car plate number
    public String getCarType() {…}      //return type of car
    public abstract double calculateCharges();
}//end of class CarWash
```

```
public class MachineWash extends CarWash
{
    private String autoService;          //type of auto service

    public MachineWash() {…}             //default constructor
    public void setMachineWash(…){…}     //a mutator to initialize all attributes
    public String getAutoService(){…}    //return type of auto service
    public double calculateCharges(){…}
    /*charge is calculated based on the following table:
```

Type Auto Service	Sedan	MPV
Snow	RM8.00	RM11.00
Bubble	RM10.00	RM15.00

```
    */
    }//end of class MachineWash
```

```
public class HandWash extends CarWash
{
private char package;                    //A-Body Wash only,
                                         //B-Body Wash and Vacuum
private boolean polish;                  //true if polish services
                                         //needed
private boolean discountCoupon;          //true if the customer has
                                         //discount coupon

public HandWash(){…}                     //default constructor
    public void setHandWash(…){…}       //a mutator to initialize all attributes
    public char getServiceType(){…}      //return type of service
    public boolean getDiscountCoupon(){…}   //return discount coupon status
    public double calculateCharges(){…}
    /*charge is calculated based on the following table:
```

Package	Sedan	MPV
A	RM11.00	RM14.00
B	RM20.00	RM25.00

```
Additionally, if the customer needs polish services, customer will need to pay RM55.00
for Sedan and RM95.00 for MPV.
10% discount will be given if the person has a discount coupon.
    */
}//end of class HandWash
```


Based on the above information, answer the following questions.

a) How does polymorphism work in the above Java program?

(3 marks)

b) Distinguish between method overloading and method overriding.

(4 marks)

c) Write Java program segments for the following tasks.

i. Write the mutator method of all classes.

(6.5 marks)

ii. Write the `calculateCharges()` method of each subclass.

(7.5 marks)

iii. Assume that data have been saved into an array of objects named `wash`, write a program segment in `main()` to count and display the number of customers who choose car wash service with polish service option.

(4 marks)

END OF QUESTION PAPER