UNIVERSITI TEKNOLOGI MARA
FINAL EXAMINATION

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

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of four (4) questions

2. Answer ALL questions 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.

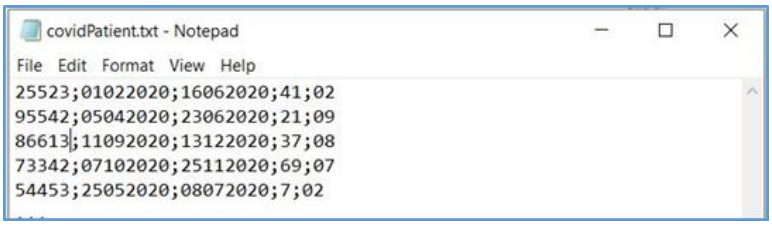
5. Answer ALL questions in English.

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

This examination paper consists of 8 printed pages

QUESTION 1

The following text file named `covidPatient.txt` shows the patient records from Kedah, Penang, Perlis and Perak who have recovered from COVID 19 started from January until December 2020.



`covidPatient.txt`

Assume the `covidPatient.txt` file consists of one thousand of COVID 19 patient records. Each record contains patient id, admission date (day, month and year- ddmmyyyy), discharge date (day, month and year- ddmmyyyy), age and state. The states are represented by two special digits as shown in the following table:

Two digits	State
02	Kedah
07	Penang
08	Perak
09	Perlis

In developing a computerized system, the object-oriented programming approach has been adopted and class `Patient` has been defined. Class `Patient` contains attributes such as `patientId`, `admissionDate`, `dischargeDate`, `age` and `state`. The methods of class `Patient` are a normal constructor, accessors and `toString()`.

Based on the above information, answer the following questions.

a) Discuss the following question and Java statements that related to input and output file.

i. Describe about Java catch block. Write any **ONE** catch block to manage exception that might occur.

(3 marks)

ii. `BufferedReader br = new BufferredReader(new FileReader("covidPatient.txt"));`

(1 mark)

iii. `br.close();`

(1 mark)

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

i. The following program segment reads data from the input file and store the data into an array of object, `patientArr` of type `Patient`. Complete the code at line marked **`*** a ***`** to tokenize the data read from the input file into variables accordingly. Then, create an object of type `Patient` with those data and store the object into `patientArr`.

```
StringTokenizer st = null;
int i = 0;
String in = null;
while((in=inFile.readLine()) != null)
{
    *** a ***
      i++;
}
```

(2.5 marks)

ii. The following program segment is supposedly to count the number of patients in each state and display the results into an output file, `State.txt`. Complete the code at line marked **`*** b ***`**.

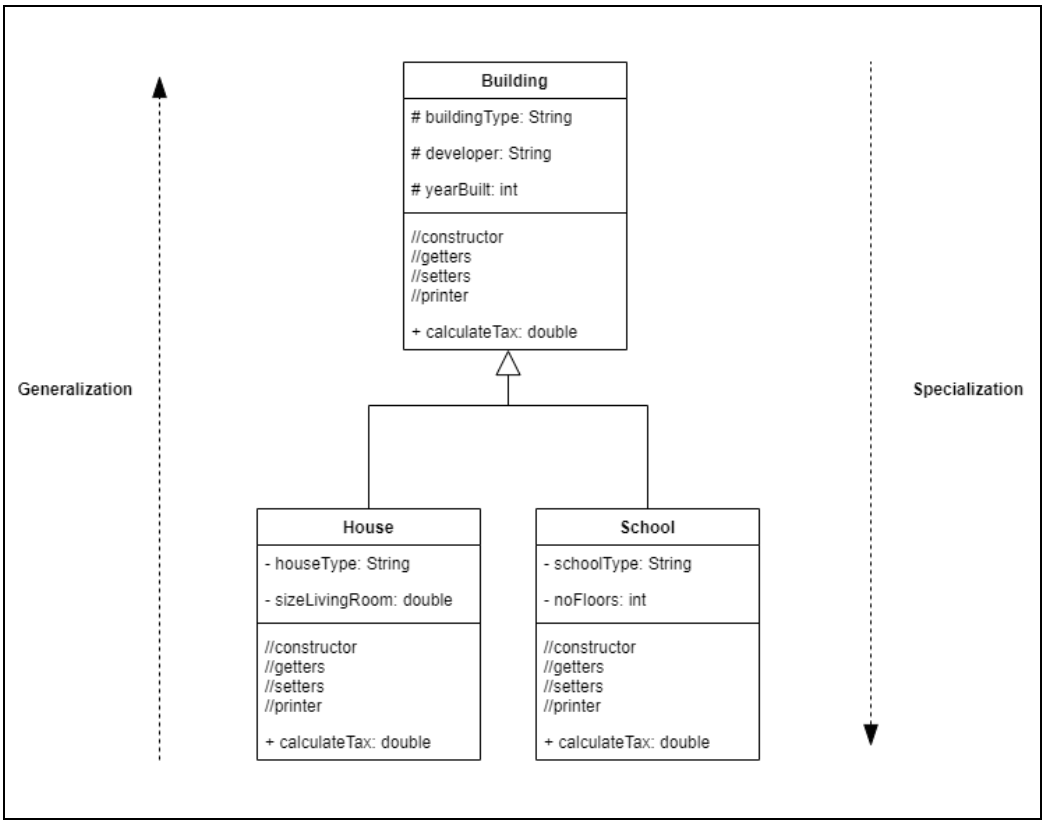
```
PrintWriter out = new PrintWriter("State.txt");
int kedah=0, perak=0, penang=0, perlis=0;
for(i=0; i<patientArr.length; i++)

          *** b ***
```

The output is generated as follows:

(2.5 marks)

QUESTION 2

The following diagram shows an example of UML class diagram for a property management system. There are exist inheritance relationships for the three classes in the diagram.



a) Briefly explain the concept of ***Generalization*** and ***Specialization*** shown in the diagram?
(2 marks)

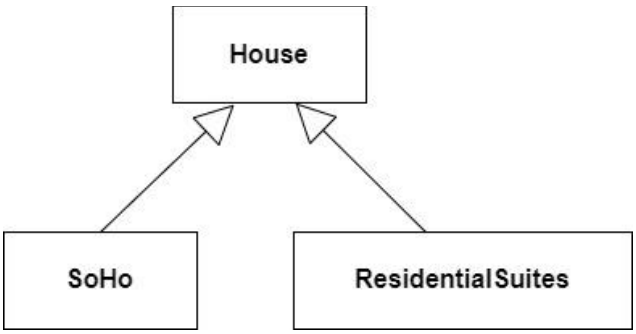
b) Identify the superclass(s) and subclass(s) shown in the diagram.
(3 marks)

c) Identify the overridden methods implemented in the diagram and state a reason for your answer.
(2 marks)

d) Based on the class diagram above, write the class header for both the superclass(s) and subclass(s).
(3 marks)

QUESTION 3

AmanSuria Group, a reputable developer in Malaysia, has launched the 1st integrated social-living hub in Setia Alam, which is a highly in-demand residential area. This development consists of SoHo and residential suites. For SoHo, buyers can only choose one type of house with three different packages. Meanwhile, for residential suites, buyers can choose up to three types of residential suites according to the number of rooms. Below are relationships and information for `House`, `SoHo`, and `ResidentialSuites` classes.



Superclass: `House`

Attribute:

```
private String buyerName;
private long ic;
private String gender;       //Female or Male
private boolean bumiputera; //true if the buyer is Bumiputera
```

Methods: constructor, accessors, `toString()`

Subclass: `SoHo`

Attribute:

```
private double unitPrice;
private char packages;//F:Fully Furnished, P:Partially Furnished,
                      //U:Unfurnished
```

Methods: constructor, accessors, `toString()`

```
public double sohoPrice(){…}
```


Subclass: `ResidentialSuites`

Attribute:

```
private String residentialSuiteType; //A1:1 room, B:2 room,
                                     //C:3 room
```

Methods: constructor, accessor, `toString()`

```
public double residentialPrice(){…}
```

a) Based on the class diagram and information above, write Java program segments that perform the following tasks:

i) A normal constructor for `House` and `SoHo`.

(3 marks)

ii) Write the definition of method `sohoPrice()` for `SoHo` that calculates and returns the house price by adding the unit price with the additional price based on the packages chosen. The additional price for the packages is as follows:

Package	Additional Price (RM)
F	50000.00
P	20000.00
U	none

Bumiputera buyers will receive a 10% discount.

(6 marks)

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

i) Declare an array named `buyer` to store 320 `SoHo` objects.

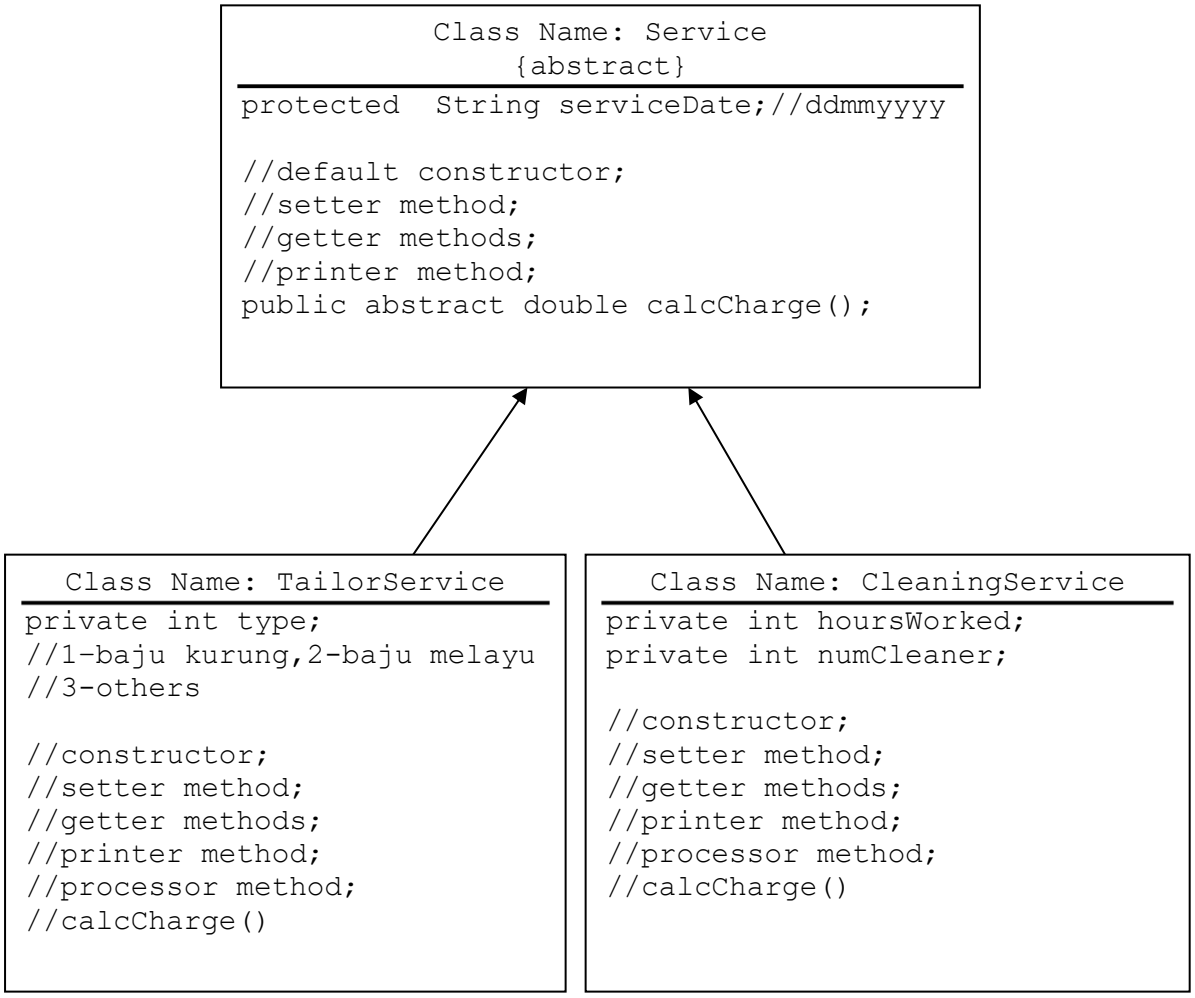
(1 mark)

ii) Display all information and the total number of SoHo female buyers who bought fully furnished package.

(5 marks)

QUESTION 4

Shah Moss Sdn Bhd offers two types of services: tailor service and cleaning service. Given the following relationship and information of `Service`, `TailorService` and `CleaningService` classes.



Based on the above information, answer the following questions.

a) Why is class `Service` declared as an abstract class? State a reason for your answer.
(1 mark)

b) How does the abstract method `calcCharge()` in class `Service` apply polymorphism?
(3 marks)

c) Overriding is a form of polymorphism in object-oriented program. Find any overridden method from the above relationship. Justify your answer.
(3 marks)

d) Write Java program segments for the following tasks.

i. Write the definition for method `calcCharge()` in subclass `TailorService`. The calculation is based on the following table.

Type	Price(RM)
1	65.00
2	90.00
3	50.00

(3 marks)

ii. Write the definition for method `calcCharge()` in subclass `CleaningService`. Charges are calculated by multiplying the hourly rate, number of cleaners and number of hours required to complete a task. The rate per hour is RM7.00.

(2 marks)

e) In a class application, write Java program statements to do the following tasks.

i. Declare and create an array of `Service` objects named `serve`. User determines the number of objects.

(2 marks)

ii. Read and store data into the objects.

(6 marks)

iii. Display the information of cleaning services that spent more than 10 hours.

(3 marks)

iv. Calculate and display total charge of all services.

(2 marks)

END OF QUESTION PAPER