



**UNIVERSITI TEKNOLOGI MARA
FINAL ASSESSMENT**

COURSE	:	OBJECT ORIENTED PROGRAMMING
COURSE CODE	:	CSC186
EXAMINATION	:	FEBRUARY 2021
TIME	:	3 HOURS

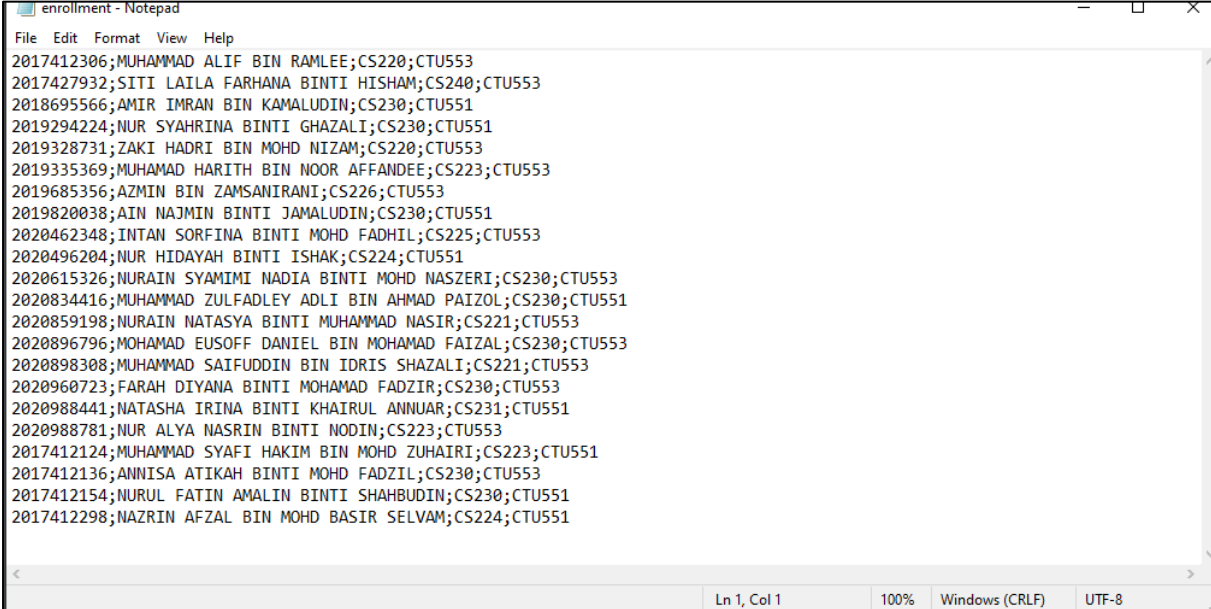
1. This question paper consists of 3 Questions.
2. Answer ALL questions by using A4 papers. Start each answer on a new page.
Scan and Save as PDF in one file only.

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

This examination paper consists of 6 printed pages

QUESTION 1

Kolej Universiti Cerdik Bijaksana offers two elective courses that can be enrolled by many students from many programs. The following text file, `enrollment.txt` contains the enrollment records of students for courses CTU553 and CTU551:



```
enrollment - Notepad
File Edit Format View Help
2017412306;MUHAMMAD ALIF BIN RAMLEE;CS220;CTU553
2017427932;SITI LAILA FARHANA BINTI HISHAM;CS240;CTU553
2018695566;AMIR IMRAN BIN KAMALUDIN;CS230;CTU551
2019294224;NUR SYAHRINA BINTI GHAZALI;CS230;CTU551
2019328731;ZAKI HADRI BIN MOHD NIZAM;CS220;CTU553
2019335369;MUHAMMAD HARITH BIN NOOR AFFANDEE;CS223;CTU553
2019685356;AZMIN BIN ZAMSANIRANI;CS226;CTU553
2019820038;AIN NAJMIN BINTI JAMALUDIN;CS230;CTU551
2020462348;INTAN SORFINA BINTI MOHD FADHIL;CS225;CTU553
2020496204;NUR HIDAYAH BINTI ISHAK;CS224;CTU551
2020615326;NURAIN SYAMIMI NADIA BINTI MOHD NASZERI;CS230;CTU553
2020834416;MUHAMMAD ZULFADLEY ADLI BIN AHMAD PAIZOL;CS230;CTU551
2020859198;NURAIN NATASYA BINTI MUHAMMAD NASIR;CS221;CTU553
2020896796;MOHAMAD EUSOFF DANIEL BIN MOHAMAD FAIZAL;CS230;CTU553
2020898308;MUHAMMAD SAIFUDDIN BIN IDRIS SHAZALI;CS221;CTU553
2020960723;FARAH DIYANA BINTI MOHAMAD FADZIR;CS230;CTU553
2020988441;NATASHA IRINA BINTI KHAIRUL ANNUAR;CS231;CTU551
2020988781;NUR ALYA NASRIN BINTI NODIN;CS223;CTU553
2017412124;MUHAMMAD SYAFI HAKIM BIN MOHD ZUHAIRI;CS223;CTU551
2017412136;ANNISA ATIKAH BINTI MOHD FADZIL;CS230;CTU553
2017412154;NURUL FATIN AMALIN BINTI SHAHBUDIN;CS230;CTU551
2017412298;NAZRIN AFZAL BIN MOHD BASIR SELVAM;CS224;CTU551
Ln 1, Col 1 100% Windows (CRLF) UTF-8
```

Assume the text file consists of thousands of student records. The attributes for each record are student ID, student name, program and course. The following information is about class `Enroll`:

Class:`Enroll`**Attributes:**

```
String studID;
String studName;
String program;
String course;
```

Methods:

```
//default constructor
//normal constructor
//setter
//getters
boolean isCTU551() //returns true if the student register CTU551
toString()
```

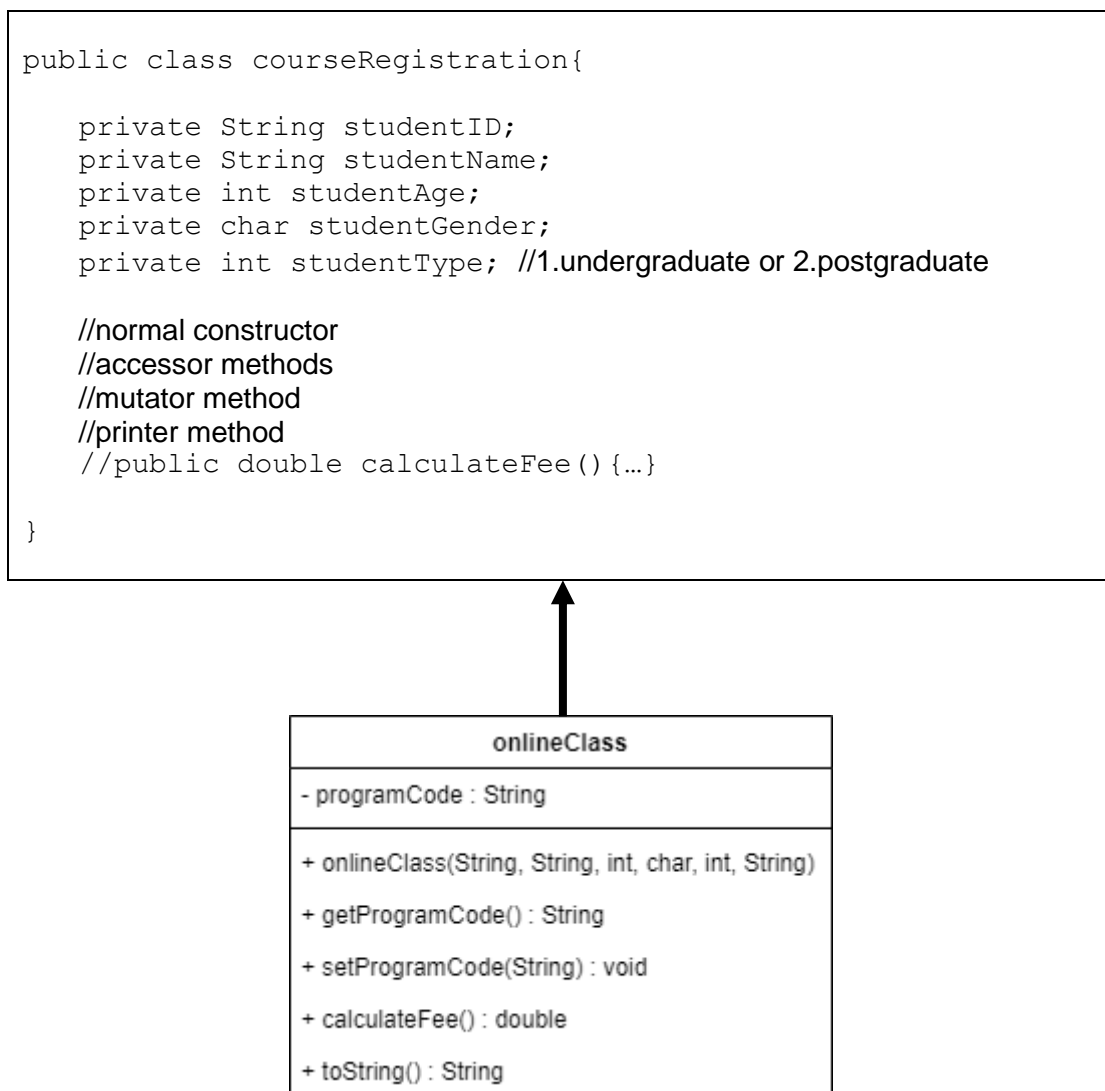
Write a complete JAVA program to perform the following tasks:

- Read the records from file `enrollment.txt`, one by one and store it in an `Enroll` object named `enroll1`.
- Count and display the number of students who register CTU551.
- Store the student ID and student name of CS240 students who register CTU553 into an output file named `CS240_CTU553.txt`.
- Write any one exception handling operations to deal with the file input-output errors.

(15 marks)

QUESTION 2

Harold Cohen is one of the most progressive private higher education institutions. Due to a high demand in computer science and engineering studies, the institution offers online classes to prospective students. The following diagram shows the inheritance hierarchy used in developing a course registration system for the institution.



a) Based on the above diagram, perform the following tasks.

- i. Identify the superclass and subclass.

(2 marks)

- ii. Identify an additional data member for the subclass.

(1 mark)

- iii. Which method implements method overriding. Give a reason for your answer.

(2 marks)

b) Write a complete class definition for `onlineClass` that includes the following methods:

- A normal constructor.
- A mutator method to initialize its additional data member.
- An accessor method.
- An overriding printer method named `toString()` that displays information of online class.
- Processor method named `calculateFee()` that returns the price after discount. The fee is calculated based on the following table:

Program Code	Discount rate (%)	
	Undergraduate	Postgraduate
COMP	40	30
ENG	35	25

Basic fee for undergraduate and postgraduate are **RM1600 and **RM2100** respectively.*

(10 marks)

c) Write the main program to perform the following tasks:

- Create an array of **ONE HUNDRED (100)** `onlineClass` objects named `online`.
- Input and store all information about students into the array.
- Update program code from ENG to COMP for student ID "2017111222".
- Calculate and display the total fee collected from engineering program for undergraduate students.
- Display the program code enrolled by a student named "Alexander".

(10 marks)

QUESTION 3

One IT Solution Sdn Bhd is a software house company. They are planning to provide a system to store data about teachers. Given are `SchoolTeacher` and `KindergartenTeacher` subclasses which are inherited from `Teacher` superclass.

Superclass: Teacher**Attributes:**

```
String name;  
    String icNo;           // identification card no  
String subjectTaught;     // English, Math, History  
int  yos;                 // year of service
```

Methods:

```
normal constructor  
accessor methods  
toString()  
abstract double calcSalary()
```

Subclass: SchoolTeacher**Attributes:**

```
String grade;           //teacher grade, e.g: DG41, DG44, DG48
```

Methods:

```
normal constructor  
accessor method  
toString()  
double calcSalary()
```

Subclass: KindergartenTeacher**Attributes:**

```
int  otHours;           //overtime hours per month
```

Methods:

```
normal constructor  
accessor method  
toString()  
double calcSalary()
```

- a) Write the normal constructor for subclass `SchoolTeacher`. (2 marks)
- b) Write the definition of method `calcSalary()` for both subclasses that calculate and return the teacher's salary based on the following information.
- i. The salary of school teacher is calculated based on the grade as shown in Table 1:

Table 1 : School Teacher Salary

Grade	Salary (RM)
DG41	2000
DG44	3400
DG48	5000
DG52	5600

- ii. For kindergarten teachers, the salary is calculated based on the year of service as shown in Table 2 and overtime hours.

Table 2 : Kindergarten Teacher Salary

Year of Service	Basic salary (RM)
≤ 2	1300
≤ 5	1900
> 5	2100

Each overtime hour will be paid RM15. Salary for the kindergarten teachers is the total of basic salary and overtime hours pay.

(6.5 marks)

- c) Based on the classes given, write Java statements to do the following:
- i. Declare an array of 20 `Teacher` objects named `teach`. (1 mark)
- ii. Display the information of English teachers who have been teaching for more than 10 years. (3 marks)
- iii. Display the name and salary of school teachers whose grade is DG44. (3.5 marks)
- iv. Calculate and display the total overtime hours done by the teachers. (4 marks)

END OF QUESTION PAPER