**CA4 Programming 2 – Resit paper – Mark capped at 40 if no Cert.**

**Please answer all four questions.**

# Question 1 : Creating a Apprentice Class [25 marks]

Write a class to represent an Apprentice:

1. The class should have three attributes to represent the Apprentice’s name (string), training hours completed(int), and a unique Apprentice number (int). These should use the **protected** keyword to enable access by child classes **[5 marks].**
2. Provide a default constructor which sets a unique value for the Apprentice  
   number. **[3 marks]**
3. Provide a single parameterised constructor which should initialise the name and training hours completed attributes to values which are passed to the constructor. It should also set a unique value for the Apprentice number. **[3 marks]**
4. Provide getter and setter methods for the marks and the name **[4 marks]**
5. Provide a method **GetHourlyRate** which will return a double**,** based on the value of the training hours completed as follows:

**Training Hours Rate**

<400 9.50

400-599 10.50

600-699 12.00

700+ 14.00 **[6 marks]**

1. Provide a ToString method to print out the Apprentice details (Apprentice Number, name, hours training completed) as follows **[4 marks]**

1 Gemma 770 **[ total : 25 marks]**

# Question 2: Inheritance [15 marks]

1. Write a subclass of this Apprentice class to represent a qualified apprentice called Certified. For this you should include one additional attribute for specialism (string).

**[4 marks].**

1. Provide default and parameterised constructors, with the parameterised one also including specialism. **[4 marks]**
2. Write a replacement **GetHourlyRate** that will determine the hourly rate as follows:

**Specialism Rate**

Electricity 18.50

Plumbing 19.50

Carpentry 17.00

Electronics 20.00

**[4 marks].**

1. Write a replacement ToString method to also print the specialism – e.g.
   1. Gemma 1200 Plumbing

**[3 marks].**

**[Total : 15 marks]**

# Question 3 – Testing the classes in Main [10 marks]

Write a short piece of code in the main method to demonstrate your code works so far. For example:

1. Declare an array of 4 Apprentice objects
2. Fill this array with two of each type of object, using your constructors. (there is no need to read the data in from the console – just use the values below in the example output)
3. Loop through the array and print the attributes for each of these objects to the console.

**[Total: 10 marks]**

**Example Output**

1 anna 200 9.50

2 james 700 14.00

3 annabella 1200 17.00 Carpentry

4 Paddy 1550 19.50 Plumbing

# **Question 4- Reading in data from a file. [ 40 marks]**

Download the file **Apprentices.csv** from Moodle, see the data in the appendix.

This is a csv file, with each line containing details on Apprentices their name and marks. For some Apprentices it also contains details of specialism. Write a method called ReadApprentices to.

1. Open the file for reading and read create an array (or list) of 10 Apprentice objects of the appropriate type. If the line has three fields, then create an Certified object. If it has 2 fields create an Apprentice object.

**[15 marks]**

1. Ensure that that exceptions, such as file not found, are handled. Add simple data validation when reading lines from the file to:
2. check the number of fields is 2 or 3.
3. check that the second field is an integer.

**[15 marks]**

1. As above, write a short piece of code to print out the details of the objects created to ensure your method works (see Appendix).

**[10 marks]**

**[Total : 40 marks]**

**Code quality, layout and design [Total: 10 marks]**

# Submission

Please submit in the CA tile, as usual. Either

Upload the .cs files in the project.

**OR**

Upload a zipped folder of the project. If you do this please ensure that the whole project is submitted, not just the .proj file.

# Appendix 1: Data for Apprentices.csv file.

Mary,770

Jim,510

Anna,610

Liam,2220,Electronics

Saritha,1990,Plumbing

Jamie,1640,Elecitricity

Olivia,440

Ali,620

Mamadou,1430,Carpentry

Juan,90

# Appendix B

**Sample output when both arrays are printed out one after the other:**

1 anna 200 9.50

2 james 700 14.00

3 annabella 1200 17.00 Carpentry

4 Paddy 1550 19.50 Plumbing

5 Mary 770

6 Jim 510

7 Anna 610

8 Liam 2220 20.00 Electronics

9 Saritha 1990 19.50 Plumbing

10 Jamie 1640 18.50 Electricity

11 Olivia 440

12 Ali 620

13 Mamadou 1430 17.00 Carpentry

14 Juan 90