Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2022

INFORMATION TECHNOLOGY P1 (EXEMPLAR)

MARKS: **150**

TIME: **3 hours**

This question paper consists of 11 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FOUR questions. Candidates must answer ALL four questions.

2. The duration of this examination is three hours. Because of the nature of this examination, it is important to note that you will not be permitted to leave the examination room before the end of the examination session.

3. Answer only what is asked in each question. For example, if the question does not ask for data validation, then no marks will be awarded for data validation.

4. Your programs must be coded in such a way that they will work with any data and not just the sample data supplied or any data extracts that appear in this question paper.

5. Routines such as search, sort and selection must be developed from first principles. You may NOT use the built-in features of a programming language for any of these routines. Example: Do NOT use locate, sort, filter, recordcount, setlength, charinset, etc

6. Save your work regularly. Ensure that all files can be read.

7. The files that you need to complete this question paper have been given to you. The files are provided in the form of password-protected executable files.

   Do the following:
   - Double click on the password-protected executable file.
   - Click on the extract button.
   - Enter the following password: **21nOv&11rG.**

   Once extracted, the following list of files will be available in the folder **DataNov2021**:

Question 1:

Question1_u.pas
Question1_u.dfm
Question1_p.dpr
Question1_p.res

Question 2:

Question2_u.pas
Question2_u.dfm
Question2_p.dpr
Question2_p.res
Trees.txt

Question 3:

Question3_u.pas
Question3_u.dfm
Question3_p.dpr
Question3_p.res
dbConnection_u.pas
Trees.mdb
TreesBackUp.mdb

Question 4:

Question4_u.pas
Question4_u.dfm
Question4_p.dpr
Question4_p.res

QUESTION 1: GENERAL PROGRAMMING SKILLS

SCENARIO:
Complete a program to allow applicants to register and log in to The Tree Society so that they may have access to National and Regional parks for the purpose of environmental education.

Do the following:
- Open the incomplete program in the **Question 1** folder.
- Enter your full name as a comment in the first line of the **Question1_u.pas** file.
- Compile and execute the program. The program currently has no functionality.
- Follow the instructions to complete the code for each Question, 1.1, 1.2, 1.3, 1.4 and 1.5.

1.1 Menu option New Registration

Set the panel named **pnlRegister** to visible. (1)

1.2 Button [btnQ1_2] Register

Applicants will enter a start date in the **edtDate** component. It must be entered in the following format: YYYY/MM/DD. Their contract will be valid for **ONE** year. Determine the expiry date by increasing the year by one.

They will then choose an option from the combobox named **cmbAccess** to indicate whether they want to have access to National or Regional parks.

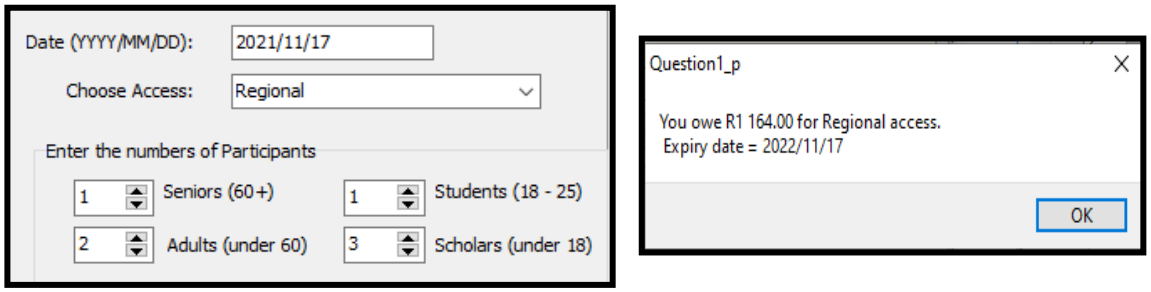
The annual fee for access to the parks is calculated as follows:
- Seniors aged 60 and over: R500
- Adults under the age of 60: R400
- Students aged 18 to 25: R300
- Scholars under 18: R80
- Children aged 6 and under: Free

Applicants will enter the number of people for each age category in the spin edits provided.

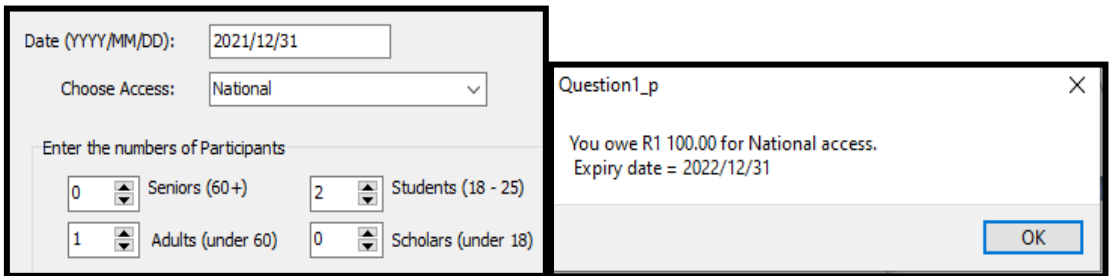
Write code to receive the inputs, then calculate and display the total amount due and the expiry date in a message component.

NOTE: Regional access will include a deduction of 40 percent from the total amount due.

Example of output:



(14)



1.3 **Menu option Log In**

Write code to do the following:

- Enable the panel named **pnlLogin**.
- Change the font colour of **pnlLogin** to green.
- Change the colour of **pnlLogin** to cream.
- Clear the input components named **edtName** and **edtPassword**.
- Set the focus to **edtName**. (5)

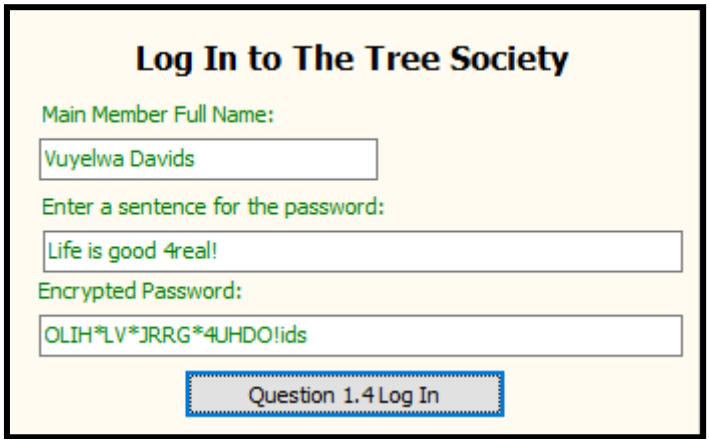
1.4 **Button [btnQ1_4] Log In**

The user will enter their name in **edtName** and a sentence for a password in **edtPassword**.

Write code to do the following:

- Get the input from the input components.
- Calculate an encrypted password using the following rules:
  - The numerical positions of the characters are increased by 3.
    Example: Each character of the password must be replaced with a character of the alphabet which is three characters to the right of the original character. 'A' becomes 'D', 'B' becomes 'E', etc.
  - All spaces must be replaced with a star (*).
  - The letter ‘Z’ must be replaced with the letter ‘A’.
  - Numbers and other characters stay the same.
  - The last three characters of the full name must be appended to the end of the encrypted password.
- Display the encrypted password in the component named **edtEncrypted**. (16)

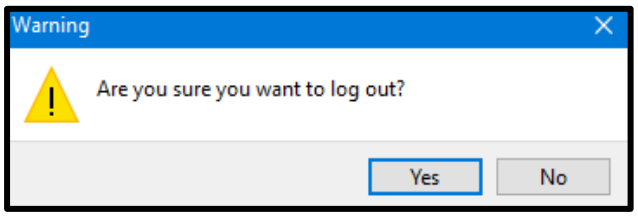
Example of output:



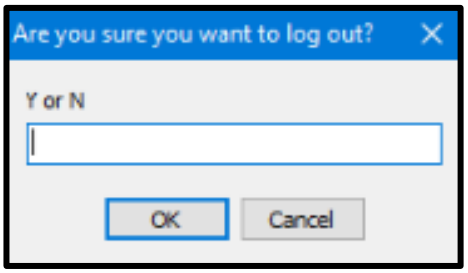
1.5 **Menu option Log Out**

Write code to ask the user to confirm that they want to log out and then close the program if they reply yes.

Example of output:



OR:



(4)

- Enter your name and surname as a comment in the first line of the program file.
- Save your program.
- A printout of the code may be required.

[40]

QUESTION 2: ARRAYS AND TEXT FILES

Do the following:

- Compile and execute the program in the **Question 2** folder. The program currently has limited functionality.
- Enter your full name as a comment in the first line of the **Question2_u.pas** file.
- Complete the code for each question as described in Question 2.

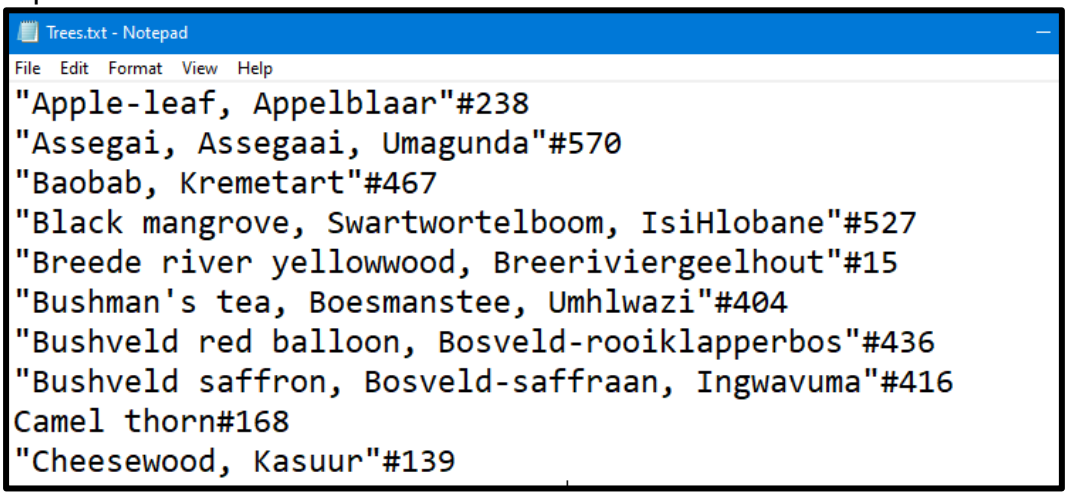
2.1 Button [Q2.1 Read and Display]

A text file is provided which contains a list of all protected tree species and the quantities that have been found in the country.
The format of the text file is as follows:

<tree name>#< quantity found>

In certain rows in the text file the tree name is not enclosed in quotation marks. Most of the tree names are enclosed in quotation marks.

Example of data in the text file **Trees.txt**:



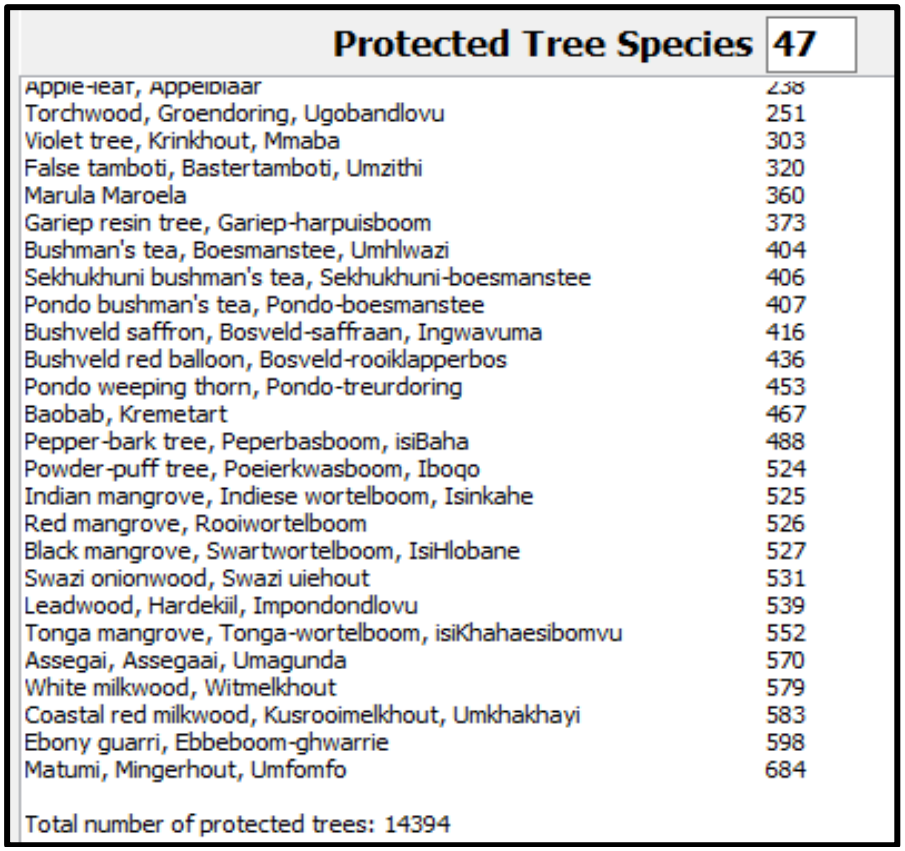
Two global arrays and an array counter have been provided as described below:

arrqty: array[1..200] of integer;
arrtrees: array[1..200] of string;
icountarr: integer;

Write code to do the following:

- Connect to the text file and read each line into the global arrays provided, separating the tree name and the quantity into each array. Make sure to remove the quotation marks from the tree name, if there are any.
- Calculate and display the total number of species in the edit box named **edtprotected**.
- Calculate the total number of trees found.
- Sort both arrays according to the quantities from lowest to highest quantity.
- Display, in **redOut**, the contents of the sorted arrays in neat columns and then display the total number of trees found.

Example of output:



Protected Tree Species	47
Apple-leaf, Appelblaar	238
Torchwood, Groendoring, Ugobandlovu	251
Violet tree, Krinkhout, Mmaba	303
False tamboti, Bastertamboti, Umzithi	320
Marula Maroela	360
Gariep resin tree, Gariep-harpuisboom	373
Bushman's tea, Boesmanstee, Umhlwazi	404
Sekhukhuni bushman's tea, Sekhukhuni-boesmanstee	406
Pondo bushman's tea, Pondo-boesmanstee	407
Bushveld saffron, Bosveld-saffraan, Ingwavuma	416
Bushveld red balloon, Bosveld-rooiklapperbos	436
Pondo weeping thorn, Pondo-treurdoring	453
Baobab, Kremetart	467
Pepper-bark tree, Peperbasboom, isiBaha	488
Powder-puff tree, Poeierkwasboom, Iboqo	524
Indian mangrove, Indiese wortelboom, Isinkahe	525
Red mangrove, Rooiwortelboom	526
Black mangrove, Swartwortelboom, IsiHlobane	527
Swazi onionwood, Swazi uiehout	531
Leadwood, Hardekiil, Impondondlovu	539
Tonga mangrove, Tonga-wortelboom, isiKhahaesibomvu	552
Assegai, Assegaai, Umagunda	570
White milkwood, Witmelkhout	579
Coastal red milkwood, Kusrooimelkhout, Umkhakhayi	583
Ebony guarri, Ebbeboom-ghwarrie	598
Matumi, Mingerhout, Umfomfo	684

Total number of protected trees: 14394

(32)

2.2 **Button [Q2.2 Endangered list]**

Species which have had less than 100 trees found, must be put on the endangered list.
Write code to do the following:

- Create a text file named **'Endangered.txt'**.
- Use the two global arrays to find the names of all tree species where the quantity found is less than 100.
- Display the name of the endangered tree in the richedit named **redOut**.
- Write the name of the endangered tree to the text file '**Endangered.txt'**.

Example of output to the text file and the richedit:

```
Breede river yellowwood, Breeriviergeelhout
Outeniqua yellowwood, Outeniquageelhout, Umsonti
Henkel's yellowwood, Henkel se geelhout, Umsonti
Real yellowwood, Regte-geelhout, Umkhoba
Clanwilliam cedar, Clanwilliamseder
Swamp fig, Moerasvy, Umvubu
Silver tree,, Silwerboom
Saddleback sugarbush, Barberton-suikerbos
Serpentine sugarbush, Serpentynsuikerbos
Willowmore cedar, Baviaanskloofseder
```

(8)

- Enter your name and surname as a comment in the first line of the program file.
- Save your program.
- A printout of the code may be required.

[40]

QUESTION 3: DATABASE PROGRAMMING

This question consists of sub-questions 3.1 to 3.5. The following important notes are applicable to all questions:

- You are NOT allowed to modify or add to the supplied data or supplied programming code.
- Good programming techniques from first principles only must be applied.
- NO marks will be assigned for hardcoding. Use control structures and variables where necessary
- **Do NOT use filter, sort, locate, recordcount, etc.**

There are many tree species found in South Africa. A database has been designed to store details of some of these tree species and are recorded in one table.

A table named **TreeName** has been supplied in the database named **Trees.mdb.**

A sample of records in this table is displayed below:

TreeID	ProjectedYear	ScientificName	OtherName	Counted	Indigenous	Description	Iconic	Common	Area	Favourite
96	2029	Ilex mitis	African holly		True		False	True	Centurion	False
116	2022	Peltophorum Africanum	African Wattle/ Weeping Wattle		True		False	False	Western Cape	False
86	2034	Faidherbia albida	Anatree		False		False	True		False
53		Calotropis procera	Apple of Sodom		False	invasive	False	False		False
118	2019	Philenoptera violacea	Apple-leaf, Appelblaar	238	False	Protected	False	False		False
73		Curtisia dentata	Assegai, Assegaai, Umagunda	570	False	Protected	False	False		False
10		Acacia melanoxylon	Australian blackwood		False	invasive	False	False		False
2		Acacia baileyana	Bailey's wattle		False	invasive	False	False		False
15	2020	Adansonia digitata	Baobab, Kremetart	467	True	Protected	True	False		False
56		Casuarina cunninghamiana	Beefwood		False	invasive	False	False		False
50		Caesalpinia gilliesii	Bird of paradise bush		False	invasive	False	False		False
45		Bruguiera gymnorrhize	Black mangrove, Swartwortelboom, IsiHloban	527	False	Protected	False	False		False
162			Black Monkey Orange		True		False	False		False
9		Acacia mearnsii	Black wattle		False	invasive	False	False		False

The design view of the table named **TreeName** which includes the field data types, is displayed below:

Field Name	Data Type	Description (O
TreeID	AutoNumber	Primary Key
ProjectedYear	Number	Year that the Tree has been designated as protected
ScientificName	Short Text	Scientific Name of the tree
OtherName	Short Text	Common name of the tree
Counted	Number	The number of trees found belonging to the tree species
Indigenous	Yes/No	Shows if a tree is indegenous to South Africa or not
Description	Short Text	The tree is either Protected or invasive
Iconic	Yes/No	Shows if a tree is iconic or not
Common	Yes/No	Shows if a tree is commonly occurring or not
Area	Short Text	The area where the tree can be purchased
Favourite	Yes/No	Shows if a tree is popular or not

NOTE:

- Connection code has been provided.
- When the **Restore Database** button is clicked, the data in the database will be restored to the original data.
- The name of the table to be used in your code must be **tblTrees,** which is the TADOTable object connected to the database.

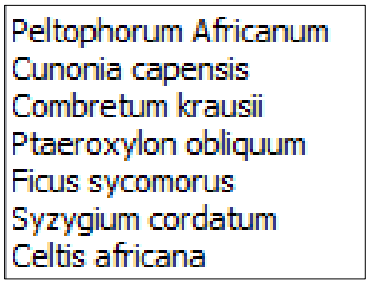
Do the following:

- Compile and execute the program in the **Question 3** folder. The program currently has limited functionality.
- Enter your full name as a comment in the first line of the **Question3_u.pas** file.
- Complete the code for each question as described in Question 3.

3.1 Button [Q3.1 Western Cape]

Display the **ScientificName** of all trees which can be purchased in the Western Cape **Area.** Display the results in the richedit named **redDisplay.**

Example of output:

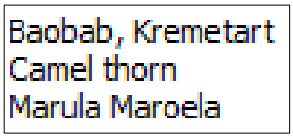


(6)

3.2 Button [Q3.2 Iconic and Protected]

Display the **OtherName** of all trees that are **Iconic** and where the **Description** is 'Protected'. Display the results in the richedit named **redDisplay.**

Example of output:



(8)

3.3 Button [Q3.3 Delete Invasive Trees]

Write code to delete all trees which have the **Description** of 'invasive'**.**

Example of output:

reeID	Projected	ScientificName	OtherName	Counted	Indigenous	Description	Iconic	Common	Area	Favourite
96	2029	Ilex mitis	African holly		True		False	True	Centurion	False
116	2022	Peltophorum Africanum	African Wattle/ Weeping Wattle		True		False	False	Western Cape	False
86	2034	Faidherbia albida	Anatree		False		False	True		False
118	2019	Philenoptera violacea	Apple-leaf, Appelblaar	238	False	Protected	False	False		False
73		Curtisia dentata	Assegai, Assegaai, Umagunda	570	False	Protected	False	False		False
15	2020	Adansonia digitata	Baobab, Kremetart	467	True	Protected	True	False		False
45		Bruguiera gymnorrhize	Black mangrove, Swartwortelboom, IsiHloban	527	False	Protected	False	False		False
162			Black Monkey Orange		True		False	False		False
77	2008	Diospyros whyteana	Bladder-nut		True		False	False		True
157	2013	Virgilia oroboides	Blossom tree, Keurboom		False		False	True		False
87	2031	Faurea saligna	Boekenhout		False		False	False		False
120		Podocarpus elongatus	Breede river yellowwood, Breeriviergeelhout	15	False	Protected	False	False		False
163			Buffalo Thorn		True		False	False		False
58		Catha edulis	Bushman's tea, Boesmanstee, Umhlwazi	404	False	Protected	False	False		False
84		Erythrophysa transvaalensis	Bushveld red balloon, Bosveld-rooiklapperbos	436	False	Protected	False	False		False
82		Elaeodendron transvaalensis	Bushveld saffron, Bosveld-saffraan, Ingwavu	416	False	Protected	False	False		False

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3.4 Button [Q3.4 Red Favourites]

Change the **Favourite** field to True for all trees that have the **OtherName** starting with the word 'Red'.

Example of output:

TreeID	Projected	ScientificName	OtherName	Counted	Indigenous	Description	Iconic	Common	Area	Favourite
115	2007	Pavetta schumanniana	Poison Bride's Bush Gifbruidbos		False		False	False		False
75	2022	Dais Cotinifolia	Pompontree		False		False	True		False
102		Lydenburgia abbottii	Pondo bushman's tea, Pondo-boesmanstee	407	False	Protected	False	False		False
151		Tephrosia pondoensis	Pondo poison pea, Pondo-gifertjie	226	False	Protected	False	False		False
66		Colubrine nicholsonii	Pondo weeping thorn, Pondo-treurdoring	453	False	Protected	False	False		False
35		Barringtonia racemosa	Powder-puff tree, Poeierkwasboom, Iboqo	524	False	Protected	False	False		False
24		Aloidendron dichotomum	Quiver tree		False		True	False		False
123		Podocarpus latifolius	Real yellowwood, Regte-geelhout, Umkhoba	18	False	Protected	False	False		False
128	2012	Protorhus longifolia	Red Beech, Rooiboekenhout		False		False	False		True
135	2003	Rhus chirendensis	Red currant, Bostaaibos		False		False	True		True
39	2026	Berchemia zeyheri	Red Ivory		False		False	False		True
134		Rhizophora mucronata	Red mangrove, Rooiwortelboom	526	False	Protected	False	False		True
129		Prunus africana	Red stinkwood, Rooistinkhout, Umdumezuz	147	False	Protected	False	False		True
68	2031	Combretum erythrophylum	River bushwillow		True		False	True	Centurion	False
170			Rubber Euphorbia		True		False	False		False
126		Prota comptonii	Saddleback sugarbush, Barberton-suikerbos	88	False	Protected	False	False		False

(9)

3.5 Button [Q3.5 Indigenous Average]

Write code to calculate and display the average number of all **Indigenous** trees that have been **Counted**. The average must be rounded to no decimal places. Display the result in the richedit named **redDisplay**.

Example of output:

Average Indigenous trees found:230

(10)

- Enter your name and surname as a comment in the first line of the program file.
- Save your program.
- A printout of the code may be required.

[40]

QUESTION 4: GENERAL PROBLEM SOLVING

Do the following:

- Compile and execute the program in the **Question 4** folder. The program currently has limited functionality.
- Enter your full name as a comment in the first line of the **Question4_u.pas** file.
- Complete the code for each question as described in Question 4.

4.1 Button [Question 4.1]

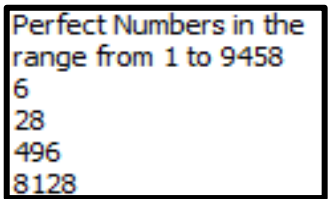
A number is a perfect number if its factors (excluding the number itself) adds up to the number.

Example: The factors of 6 are: 1 2 3 6. 1 + 2 + 3 = 6. Therefore 6 is a perfect number.

Write code to generate a random number from 1000 to 9999, both included, and then calculate and display all perfect numbers in the range from 1 to that random number.

Display the random number and perfect numbers in the **memDisplay** component.

Example of output:



(12)

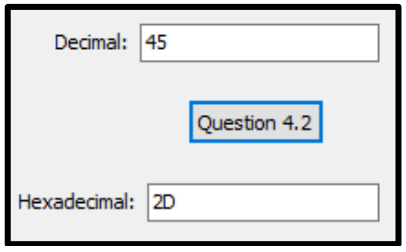
4.2 Button [Question 4.2]

The hexadecimal number system has 16 digits: 0 – 9, A – F. The hexadecimal numbers A – F represent the decimal numbers 10 – 15 respectively.

Write code to read in a decimal number that is entered into the component named **edtDecimal** and convert the number to hexadecimal. Display the hexadecimal number in the component named **edtHexadecimal.**

If no number is entered, a suitable message must be displayed and the program must be closed.

Example of output:



(18)

- Enter your name and surname as a comment in the first line of the program file.
- Save your program.
- A printout of the code may be required.

[30]

TOTAL: 150