Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2011

INFORMATION TECHNOLOGY P1

MARKS: 120

TIME: 3 hours

*INFTEA1

This question paper consists of 12 pages.

INSTRUCTIONS AND INFORMATION

1. This is a three-hour examination. 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.

2. You require the files listed below in order to answer the questions. They are EITHER on a stiffy disk OR CD issued to you, OR the invigilator/educator will tell you where to find them on the hard drive of the workstation you are using OR in which network folder it is. If the files are issued to you on a CD, you need to copy them onto your hard disk.

   QUESTION 1
   CensusInfo.mdb
   Question1_U.pas
   Question1_P.dpr
   Question1_U.dfm
   Employees.txt
   Survey.txt

   QUESTION 2
   Question2_U.pas
   Question2_U.dfm
   Question2_P.dpr
   Population.txt

   QUESTION 3
   Question3_U.pas
   Question3_U.dfm
   Question3_P.dpr
   EmpNumbers.txt

   If a disk or CD containing the files was issued to you, write your surname on the label.

3. Save your work at regular intervals as a precaution against power failures.

4. Read ALL the questions carefully. Do only what is required by the question.

5. During the examination you may use the manuals originally supplied with the hardware and software. You may also use the HELP functions of the software. You may NOT refer to any other resource material.

6. At the end of this examination session you will be required to hand in the stiffy or CD given to you by the invigilator with your work saved on it, or you must make sure that all your work has been saved on the network as explained to you by the invigilator/educator. Ensure that all files can be read.

7. You also have to hand in printouts of the programming code for all the questions you have done.

8. All printing of programming questions will take place within an hour of the completion of the examination.

SCENARIO

Census 2011 is scheduled to take place from the 10th to 31st of October 2011. It is an important exercise to update the country's population statistics as well as other information such as accessibility to proper sanitation, male-female ratios and many other aspects of a population.

They will be visiting each household or business to get the information needed to draw complete comparisons to the previous statistics gathered in 2001.

QUESTION 1: DATABASE AND DELPHI

The database, **CensusInfo.mdb**, which contains data related to this topic, has been supplied to you in a folder named **Question 1**. All the information in this database is fictitious.

Two text files have been supplied as well. If you cannot use the database provided, use the text files named **Employees.txt** and **Survey.txt** to create your own database named **CensusInfo** containing two tables named **Employees** and **Survey**. Change the data types of the fields of the tables to the specifications given below. Create a one-to-many relationship between the two tables.

The **Employees** table stores data on employees. The fields in this table are defined as follows:

Employees

Field Name	Data Type	Description
EmpNo	AutoNumber	Employee Number
Surname	Text	Surname of Employee
Initial	Text	Initial of Employee
Title	Text	Title of Employee
DOB	Date/Time	Date of Birth of Employee
Town	Text	Town which employee resides in
DriversLicence	Yes/No	Does the employee have a valid drivers licence?

The following table is an example of the data contained in the table named **Employees** in the database named **CensusInfo.mdb**.

Employees

EmpNo	Surname	Initial	Title	DOB	Town	DriversLicer
1	Ferreira	G	Mr	1978/05/12	Fort Beaufort	☑
2	Honeywell	L	Mrs	1966/04/23	Port Elizabeth	☑
3	Mendes	I	Ms	1970/02/02	Umtata	☐
4	Khoza	B	Mr	1981/05/29	Butterworth	☑
5	Freulich	I	Mrs	1969/01/05	Port Elizabeth	☑
6	Kowalski	J	Mr	1959/01/20	King Williams	☑
7	Hiles	D	Mr	1963/02/28	East London	☑
8	Lewis	G	Mrs	1979/09/10	Queenstown	☑
9	Matiso	E	Mr	1967/01/15	East London	☐
10	Matsha	J	Mr	1974/02/08	Port Elizabeth	☑
11	Openshaw	E	Mrs	1976/04/30	Umtata	☐
12	Nel	G	Ms	1981/11/20	Port Elizabeth	☑
13	Panday	I	Mr	1954/12/25	East London	☑
14	Brent	M	Mrs	1953/02/07	Aliwal North	☑
15	Conning	G	Mr	1967/10/23	Umtata	☐
16	Matthews	S	Mr	1958/09/15	Butterworth	☑
17	Eddy	W	Ms	1976/11/13	Aliwal North	☑
18	Firth	F	Mrs	1983/12/14	East London	☑
19	Notoko	X	Mr	1970/11/09	Port Elizabeth	☑

The **Survey** table stores data on the households the employees visited and information gathered for statistical purposes. The fields in this table are defined as follows:

Survey

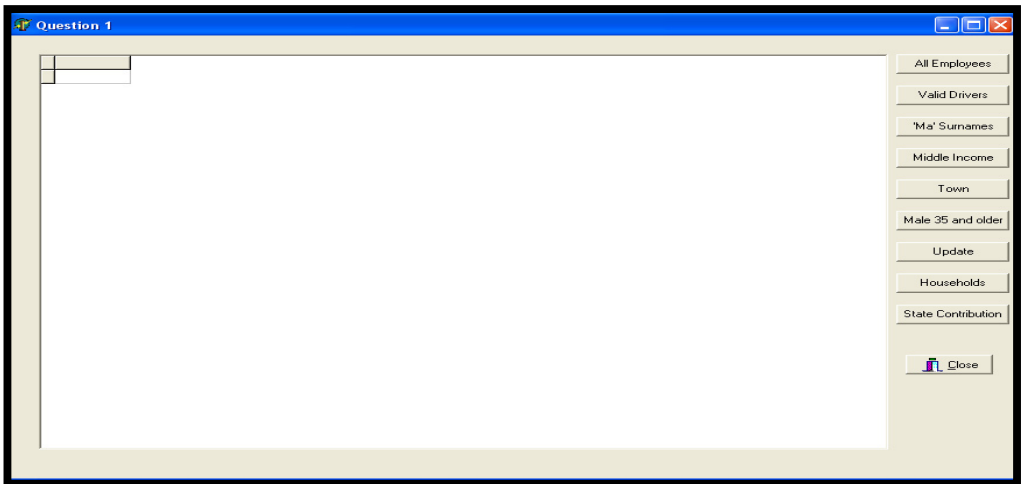
Field Name	Data Type	Description
HouseholdNo	Text	Household No assigned to keep record of how many have been surveyed
Gender	Text	M or F
Race	Text	Race: African, Indian, Coloured, White, Asian
Dependants	Number	How many dependants do you support?
Income	Text	Income Group - low, middle or high?
Water	Yes/No	Do you have access to water?
Electricity	Yes/No	Do you have access to electricity?
Sanitation	Yes/No	Do you have access to proper sanitation?
EmpNo	Number	Census Employee Number who conducted survey

The following table is an example of the data contained in the table named **Survey** in the database named **CensusInfo.mdb.**

Survey

HouseholdN	Gender	Race	Dependants	Income	Water	Electricity	Sanitation	EmpNo
HH001	M	African	2	MIDDLE	☑	☑	☑	5
HH002	M	White	1	MIDDLE	☑	☑	☑	6
HH003	M	African	2	HIGH	☑	☑	☑	31
HH004	F	Indian	3	MIDDLE	☑	☑	☑	1
HH005	F	Asian	2	HIGH	☑	☑	☑	29
HH006	M	White	4	MIDDLE	☑	☑	☑	2
HH007	F	Indian	1	MIDDLE	☑	☑	☑	3
HH008	M	African	1	MIDDLE	☑	☑	☑	4
HH009	M	White	2	MIDDLE	☑	☑	☑	27
HH010	F	Asian	2	MIDDLE	☑	☑	☑	10
HH011	F	African	2	HIGH	☑	☑	☑	17
HH012	F	White	3	MIDDLE	☑	☑	☑	28
HH013	M	Indian	4	HIGH	☑	☑	☑	5
HH014	F	African	2	MIDDLE	☑	☑	☑	30
HH015	M	White	2	HIGH	☑	☑	☑	26
HH016	M	Coloured	2	MIDDLE	☑	☑	☑	28
HH017	F	Indian	4	HIGH	☑	☑	☑	9
HH018	M	African	2	LOW	☑	☐	☐	1

You have also been supplied with an incomplete Delphi program with a unit named **Question1_U** and a project named **Question1_P** in the folder named **Question 1**. Open the incomplete program.



The program should be able to connect to the database named **CensusInfo.mdb**. When you do QUESTION 1.1 and you find that the connectivity is not in place, use the following steps to establish connection with the database:

- Click on the ADOQuery component named **qryCensus**.
- Click on the Ellipse button (three dots) to the right of the ConnectionString property in the Object Inspector.
- Click on the Build button which takes you to the Data Link Properties dialogue box.
- Select Microsoft Jet 4.0 OLE DB Provider and click on Next.
- The first option on the Connection tab sheet allows you to browse and find the **CensusInfo.mdb** file.
- Remove the user name Admin.
- Click on the Test Connection button.
- Click OK on each one of the open dialogue windows.

NOTE: If you cannot establish connectivity with the database at all when you execute the program you must still do and submit the programming code for marking.

Marks will be awarded for the programming code that contains the SQL statements in the unit named Question1_U as well as code that makes use of an inputbox as required by the question.

1.1 Complete the code in the **All Employees** button by formulating an SQL statement to display all the employees from the Employees table, sorted according to their Surnames and Initials.

Example of output of the first few records:

EmpNo	Surname	Initial	Title	DOB	Town	DriversLicence
14	Brent	M	Mrs	1953/02/07	Aliwal North	True
15	Conning	G	Mr	1967/10/23	Umtata	False
17	Eddy	W	Ms	1976/11/13	Aliwal North	True
1	Ferreira	G	Mr	1978/05/12	Fort Beaufort	True
18	Firth	F	Mrs	1983/12/14	East London	True
5	Freulich	I	Mrs	1969/01/05	Port Elizabeth	True
7	Hiles	D	Mr	1963/02/28	East London	True
2	Honeywell	L	Mrs	1966/04/23	Port Elizabeth	True
20	Jojo	V	Mr	1969/10/27	Aliwal North	False
24	Karson	J	Ms	1980/05/16	Queenstown	False

(3)

1.2 Complete the code in the **Valid Drivers** button by formulating an SQL statement to display the EmpNo, Surname and Initial from the Employees table of all the employees who have a valid driver's licence in East London.

Example of output:

EmpNo	Surname	Initial
7	Hiles	D
13	Panday	I
18	Firth	F
21	Masuka	J
25	Mooi	F
27	Naidoo	L
31	Scheepers	R

(3)

1.3 Complete the code in the **'Ma' Surnames** button by formulating an SQL statement to display the EmpNo, DOB, Surname and Town from the Employees table of all the employees whose surname starts with 'Ma'.

Example of output:

EmpNo	Surname	DOB	Town
9	Matiso	1967/01/15	East London
10	Matsha	1974/02/08	Port Elizabeth
16	Matthews	1958/09/15	Butterworth
21	Masuka	1973/08/07	East London
23	Malindi	1979/07/14	Port Elizabeth
26	Malgas	1957/03/20	Port Elizabeth

(3)

1.4 Complete the code in the **Middle Income** button by formulating an SQL statement to display the EmpNo, Surname, Town and HouseholdNo of all the households who fall in the 'Middle' income group.
NB: You will need to link the tables with an appropriate ***where*** clause to be able to do this.

Example of output of the first few records:

EmpNo	Surname	Town	HouseholdNo
5	Freulich	Port Elizabeth	HH001
6	Kowalski	King Williams Town	HH002
1	Ferreira	Fort Beaufort	HH004
2	Honeywell	Port Elizabeth	HH006
3	Mendes	Umtata	HH007
4	Khoza	Butterworth	HH008
27	Naidoo	East London	HH009
10	Matsha	Port Elizabeth	HH010
28	Nass	Umtata	HH012
30	Otto	Port Elizabeth	HH014

(5)

1.5 Complete the code in the **Town** button by formulating an SQL statement to display the HouseholdNo, EmpNo and Surname of all the employees who work in a specific town as entered by the user by means of an inputbox.

Example of output of the first few records if the town is **East London**:

HouseholdNo	EmpNo	Surname
HH082	7	Hiles
HH119	7	Hiles
HH017	9	Matiso
HH032	9	Matiso
HH029	13	Panday
HH059	13	Panday
HH077	13	Panday
HH087	13	Panday
HH103	13	Panday
HH025	18	Firth
HH034	18	Firth

(6)

1.6 Complete the code in the **Male 35 and older** button by formulating an SQL statement to display all the fields of the employees who are male and 35 years old or older.

Example of output:

EmpNo	Surname	Initial	Title	DOB	Town	DriversLicence
6	Kowalski	J	Mr	1959/01/20	King Williams Town	True
7	Hiles	D	Mr	1963/02/28	East London	True
9	Matiso	E	Mr	1967/01/15	East London	False
10	Matsha	J	Mr	1974/02/08	Port Elizabeth	True
13	Panday	I	Mr	1954/12/25	East London	True
15	Conning	G	Mr	1967/10/23	Umtata	False
16	Matthews	S	Mr	1958/09/15	Butterworth	True
19	Notoko	X	Mr	1970/11/09	Port Elizabeth	True
20	Jojo	V	Mr	1969/10/27	Aliwal North	False
25	Mooi	F	Mr	1963/06/14	East London	True
26	Malgas	K	Mr	1957/03/20	Port Elizabeth	True
28	Nass	I	Mr	1962/09/09	Umtata	False
30	Otto	Y	Mr	1953/10/28	Port Elizabeth	True

(4)

1.7 Complete the code in the **Update** button by formulating an SQL statement to update Mr Conning (EmpNo is 15) details. He has moved from Umtata to Queenstown. Display all the fields of the Employees table sorted alphabetically according to the surnames after the change has been made.

Example of output of the first few records:

EmpNo	Surname	Initial	Title	DOB	Town	DriversLicence
14	Brent	M	Mrs	1953/02/07	Aliwal North	True
15	Conning	G	Mr	1967/10/23	Queenstown	False
17	Eddy	W	Ms	1976/11/13	Aliwal North	True
1	Ferreira	G	Mr	1978/05/12	Fort Beaufort	True
18	Firth	F	Mrs	1983/12/14	East London	True
5	Freulich	I	Mrs	1969/01/05	Port Elizabeth	True
7	Hiles	D	Mr	1963/02/28	East London	True

(5)

1.8 Complete the code in the **Households** button by formulating an SQL statement that will determine and display how many households an employee has 'counted', when the employee number is entered via an inputbox.

Example of output if the EmpNo entered is **7**:

Households Counted
2

(5)

1.9 Complete the code in the **State Contribution** button by formulating an SQL statement to display the HouseholdNo, Dependents, Income and State Contribution fields.
State Contribution is a calculated field which reflects the contribution of the state towards the education and well-being of a child. R260 is paid per dependent. The values in the **State Contribution** field must be neatly displayed including the currency.

Example of the output of the first few lines:

HouseholdNo	Dependants	Income	State Contribution
HH001	2	MIDDLE	R 520.00
HH002	1	MIDDLE	R 260.00
HH004	3	MIDDLE	R 780.00
HH006	4	MIDDLE	R 1,040.00
HH007	1	MIDDLE	R 260.00
HH008	1	MIDDLE	R 260.00
HH009	2	MIDDLE	R 520.00

(6)

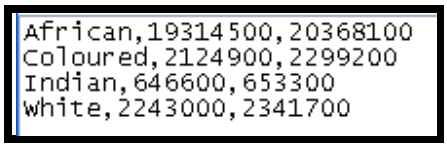
- Enter your name and surname as a comment line in the first line of the file named **Question1_UXXXX.pas** containing the SQL statements.
- Save the unit **Question1_UXXXX** and the project **Question1_PXXXX** (File|Save All).
- Make a printout of the code of the **Question1_UXXXX.pas** file. **[40]**

QUESTION 2: DELPHI PROGRAMMING

This question is intended to test object-oriented programming skills. You are required to produce a solution that includes all classes specified in the instructions. No marks will be allocated to any alternative solution such as one program not creating an object.

You have been supplied with a text file named **Population.txt**, which contains statistics about the population gathered from the Mid-Year Census conducted in 2010.

The contents of the text file is shown below:



The race is given first, then the number of males of that particular race followed by the number of females.

2.1 Create an object class (another unit) named Population_U. All fields in this class are private and all methods are public. The fields and methods that you need to create and code are described below:

2.1.1 Define a class named **TPop**. Create appropriately named and typed private fields to hold the following data:
Race
Males
Females
Total (4)

2.1.2 Write a **constructor** method which accepts the race, the number of males and the number of females as parameters. All the fields must be initialised in the constructor. (4)

2.1.3 Write a method named **tostring** that builds and returns a string with information about the population formatted as follows:

Race<tab>male values<tab>female values (3)

2.1.4 The population is calculated by adding the male and female values. Write a method **calctotalpop** that calculated the total population. (2)

2.1.5 Write an appropriately named 'get' method (accessor method) to return the total population. (2)

2.1.6 Write an appropriately named 'get' method (accessor method) to return the racial group. (2)

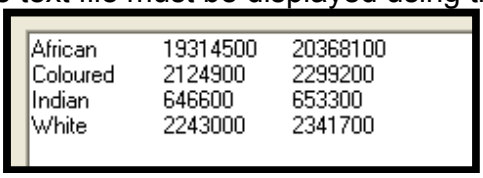
2.1.7 Write an appropriately named 'get' method (accessor method) to return the number of males in the population. (2)

2.2 Write code to do the following in the Question2_UXXXX file (class).

2.2. Create an array named **arrpop** that holds objects of **TPop**. Write code in the OnActivate Event Handler of the form to read information from the text file Population.txt according to the following steps:

a) Separate the text into race, number of males and number of females.
b) Use a counter variable to keep track of how many items there are in the array.
c) Use this information to place a new object into the array arrpop using the constructor created in QUESTION 2.1.2. (13)

2.2.2 **Menu Option: Display Population 2001 Stats**
All the contents of the text file must be displayed using the tostring method.



(2)

2.2.3 **Menu Option: Total Population**
This option displays the overall population of South Africa. The necessary methods must be called. Display the value in the richedit provided.

(5)

2.2.4 **Menu Option: Total Whites**
This option displays the number of white people in the population at that time. Call the necessary methods and display the total in the richedit with a suitable heading.

(4)

2.2.5 **Menu Option: Percentage of Males**
Calculate the percentage the male population forms of the entire population. The percentage must be displayed in the richedit, rounded off to two decimal places.

(7)

- Enter your name and surname as a comment line in the first line of the files named **Question2_UXXXX.pas** and **Population_UXXXX.pas**.
- Save the units **Question2_UXXXX, Population_UXXXX** and the project **Question1_PXXXX** (File|Save All).
- Make a printout of the code of the **Question2_UXXXX.pas** as well as the **Population_UXXXX.pas** file. **[31]**

QUESTION 3: DELPHI PROGRAMMING

All employees must be given a new employee number that will be created for them using their surname and initial as well as a random number.

The text file that will be needed is saved as **EmpNumbers.txt** and the contents of the text file is as follows:

```
Ferreira,G
Honeywell,L
Mendes,I
Khoza,B
Freulich,I
Kowalski,J
Hiles,D
Lewis,G
Matiso,E
Matsha,J
```

The code to get the contents of the text file into array **arrEmp** has been written for you in the FormCreate Event Handler. Do not alter the code. The array **arrEmp** as well as a counter is declared globally. The counter is named icount which contains the total number of elements in the array.

3.1 Write a procedure **CreateEmpNum** that will automatically create a unique employee number for each employee and store it in an array called **arrNew**.

CreateEmpNum will receive the counter as a value parameter and will then use arrEmp to process the initial, surname and the new employee number, which must be sent back to the calling procedure as reference parameters.

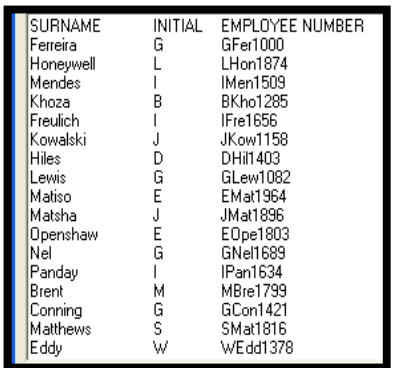
The employee number will be created by using the initial, the first three letters of the surname and a random number between 1000 and 1999. (13)

3.2 Write a procedure named **SaveEmpNum** to create a new text file **EmpNewNumbers.txt**. If the text file already exists it must add to the text file. SaveEmpNum will have to call the procedure CreateEmpNum to generate the new employee number. The content of the text file should be in the following format:

Surname,Initial,EmployeeNumber

Display a suitable message once the text file has been successfully created or updated. (9)

3.3 Write code for the **Display and Save** button that will call the procedure **CreateEmpNum** as well as procedure **SaveEmpNum** and display the surname, initial and the new employee number. It must be neatly displayed in columns with suitable headings.



SURNAME	INITIAL	EMPLOYEE NUMBER
Ferreira	G	GFer1000
Honeywell	L	LHon1874
Mendes	I	IMen1509
Khoza	B	BKho1285
Freulich	I	IFre1656
Kowalski	J	JKow1158
Hiles	D	DHil1403
Lewis	G	GLew1082
Matiso	E	EMat1964
Matsha	J	JMat1896
Openshaw	E	EOpe1803
Nel	G	GNel1689
Panday	I	IPan1634
Brent	M	MBre1799
Conning	G	GCon1421
Matthews	S	SMat1816
Eddy	W	WEdd1378

(8)

- Enter your name and surname as a comment line in the first line of the file named **Question3_UXXXX.pas.**
- Save the unit **Question3_UXXXX** and the project **Question3_PXXXX** (File|Save All).
- Make a printout of the code of the **Question3_UXXXX.pas** file. **[30]**

TOTAL: 120