GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

COMPUTER STUDIES HG
(Second Paper : Theory)

OCTOBER / NOVEMBER 2005
OKTOBER / NOVEMBER 2005

TIME: 3 hours

MARKS: 200

INSTRUCTIONS:

- Answer ALL the questions.
- Read the questions thoroughly.
- This paper consists of 25 pages. Check that your paper is complete.
- Number your answers clearly.
- The programming section consists of Delphi and Pascal questions. Answer EITHER the Pascal OR the Delphi questions.
- Coding may be done in pencil.

QUESTION 1
DATA REPRESENTATION

1.1 Name THREE types of logical gates that can be used in combination to build any digital device. (3)

1.2 In order to take Additional Mathematics as an extra subject, a learner has to first take Mathematics(X). In addition, the learner has to take Science(Y) or Accountancy(Z). Use Boole-variables and write down a Boolean expression to represent these conditions. (2)

1.3 Simplify the following Boolean expression by using Boolean laws.
$F(A,B) = (A + B).(B + A')$ (4)

1.4 Explain why the simplification of Boolean expressions is meaningful during the design of circuits. (2)

1.5 Draw a circuit diagram of the following Boolean expression:
(do not simplify)
$F(x,y,z) = x'yz + x + yz$ (4)

[15]

QUESTION 2
COMPUTER ARCHITECTURE

2.1 The quantity of RAM necessary for a computer is usually determined by the software that will be used. Order A, B and C in sequence of applications that require the least RAM to applications that require the most RAM.

    A.   Multimedia
    B.   Video-editing
    C.   Use of MS Office   (2)

2.2 Show in a table THREE differences between Dynamic and Static RAM. (3)

2.3 Which types of RAM are being associated with the following memory modules?

    2.3.1   DIMMS

    2.3.2   RIMMS   (2)

2.4 MP3 players make use of Flash memory.

    2.4.1   What is **Flash memory**?   (2)

    2.4.2   Name another device that uses Flash memory.   (1)

2.5   2.5.1   Give THREE different examples of control cards that can be plugged into plug-in slots.   (3)

    2.5.2   Most cards support plug and play. What does this statement mean?   (2)

2.6   2.6.1   Give the function of the system clock and explain briefly how it works.   (3)

    2.6.2   Write down the correct letter(s) where the date and time settings can be corrected on your computer if they are incorrect.

        A.   CMOS
        B.   BIOS
        C.   System clock
        D.   Windows Regional Settings

    (2)

2.7   Consider the following computer configuration and then answer the questions:

Desktop 2500

Intel Pentium 4 Processor

2 GHz with 256 KB built-in L2 cache
1 GB DDR SDRAM
19" Flat Panel Display
60 GB Ultra ATA Hard Disk
4 PCI Slots, 1 AGP Slot
4 USB Ports (2 in Front)
Front Audio Port
64 MB Video Card
Microsoft Windows XP
Microsoft Office XP Standard

2.7.1   Which component on the motherboard contains built-in cache memory?   (1)

2.7.2   Why will L2 cache memory increase the performance of the computer
with up to 40%?   (2)

2.7.3   Name TWO advantages of a "Flat Panel Display".   (2)

2.7.4   Give TWO differences between PCI- and AGP-buses.   (2)

2.7.5   Name TWO outstanding attributes of Windows XP that were not present in
previous versions.   (2)

2.8   What is the **technique** called that executes one instruction on multiple data?   (1)

2.9   Name THREE advantages of using smaller transistors in the CPU.   (3)

2.10   Choose an applicable port for each of the following descriptions.
Select from USB, SCSI, AGP, Firewire, IrDA, MIDI, Parallel, Serial, PS/2.
Each port occurs only once.

2.10.1   A type of port required if data is transmitted via infrared lightwaves.

2.10.2   Connects devices by sending a number of bits simultaneously.

2.10.3   It is a standard high speed parallel interface to link devices to a computer.

2.10.4   A type of serial port that enables devices to transmit data at
high speed – 400 Mbps.

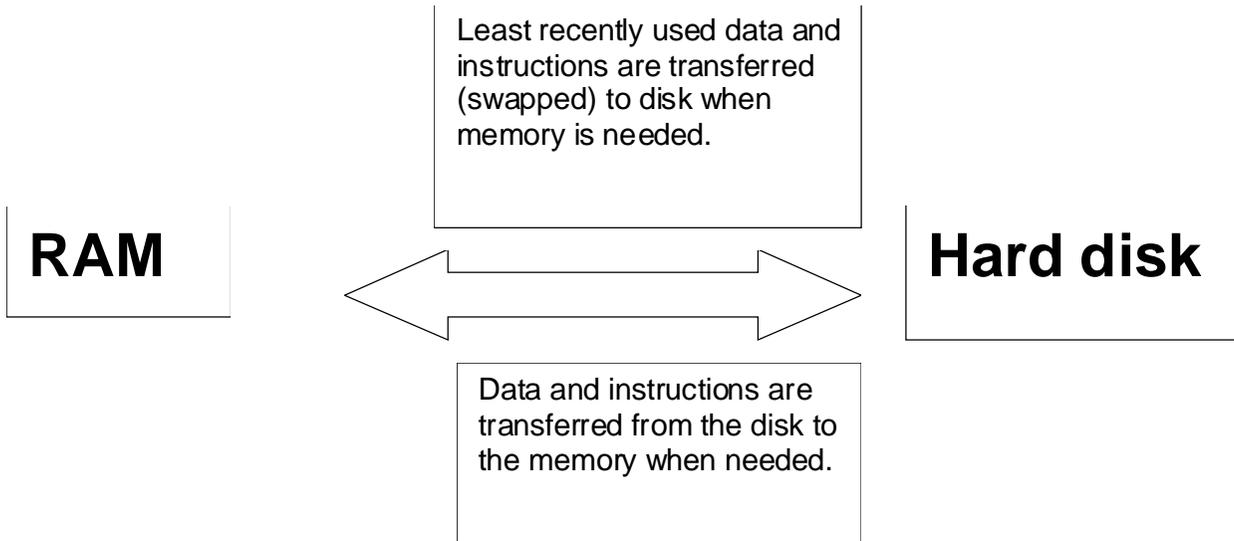2.10.5   A type of interface that transmits data bit by bit.

2.10.6   A special type of serial port that connects a system unit to a musical instrument

2.10.7   A serial port specification that allows the connection of up to 127 devices to the computer   (7)

[40]

QUESTION 3
SYSTEM SOFTWARE

3.1   Most PDAs operate with single-task operating systems.

     3.1.1   Explain what a **single-task operating system** is.   (1)

     3.1.2   Give an example of a single-task operating system.   (1)

     3.1.3   Name a use for a PDA.   (1)

3.2   If an operating system is loaded, different steps are executed. Explain briefly what happens during the POST(Power-on-Self Test) phase.   (2)

3.3   What is the purpose of memory management?   (3)

3.4   What is the function of the scheduler?   (1)

3.5   Name TWO examples of utilities that are part of the Windows operating system AND give a description of the tasks of the programs.   (4)

3.6   Give TWO **unique** attributes of a network operating system.   (2)

3.7   What are programs like WINZIP and PKZIP used for?   (1)

3.8   What is a **driver program**?   (1)

3.9   Explain the difference between a **compiler** and an **interpreter**.   (2)

3.10 What is represented by the diagram below?

| RAM | Least recently used data and instructions are transferred (swapped) to disk when memory is needed. | Hard disk |

Data and instructions are transferred from the disk to the memory when needed.

(1)
[20]

QUESTION 4
DATA COMMUNICATION

4.1 Complete the table that compares a wireless Ethernet network with an Ethernet network linked with cables.

	Wireless Ethernet network	**Ethernet linked with cables**	
Communication media	4.1.1	Cables	(1)
Network devices required	Wireless network card, wireless access point	4.1.2	(2)
Security	4.1.3	Good security by using the rights of users and firewalls	(1)
Where is it used?	4.1.4	In classrooms, offices on one level	(1)
Advantage	4.1.5	Easy to set up, reliable	(1)

4.2 A company advertises as follows:

ADSL
The way to get the most from the Internet
Tried, tested and reliable.

Write down THREE advantages of ADSL. (3)

4.3 4.3.1 Name TWO differences (except speed) and ONE similarity between the following connections:

- 64 K ISDN
- 56 K Analogue dial-up line (3)

4.3.2 Which type of data is more suitable for transmission via an ISDN line as opposed to an analogue line? (2)

4.4 Name THREE advantages of circuit switching/ line switching. (3)

4.5 What is the function of an analogue modem? (2)

4.6 Which device can interpret and translate different protocols of different networks in order to enable communication? (1)

4.7 Write down only the correct letter next to the question number.

4.7.1 A real-time Internet communication service that informs you which persons are connected and enables you to directly send and receive messages and files.

A. E-mail
B. Instant Messaging
C. Newsgroups
D. Internet

4.7.2 An Internet standard that makes it possible to electronically transfer files to any other computer in the world to which you could gain access.

A. FTP
B. Web Folders
C. Chat Rooms
D. E-mail

4.7.3 A network which links computers in a small geographical area, such as a house or a school computer centre.

A. LAN
B. MAN
C. WAN
D. Internet

4.7.4   All the computers and devices in the network are linked to a hub.

    A.   Bus network
    B.   Ring network
    C.   Star network
    D.   FDDI

4.7.5   Internet data transmission usually uses the following protocol:

    A.   Ethernet
    B.   TCP/IP
    C.   Bluetooth
    D.   Token Ring

4.7.6   _____ is a standard for LAN and MAN topology, and is used with fibre optic cables in a physical ring- or star topology.

    A.   ISDN
    B.   ATM
    C.   ADSL
    D.   FDDI

4.7.7   It is a protocol designed for packet switching but it uses cell switching.

    A   TCP/IP
    B.   ATM
    C.   ADSL
    D.   FDDI

4.7.8   This network device can link two networks that use different architectures.

    A.   Router
    B.   Bridge
    C.   Amplifier
    D.   Hub

4.7.9   This term refers to the total data handling capacity of a communication medium per time interval.

    A.   Baud
    B.   Bandwidth
    C.   Bits per second
    D.   Byte

4.7.10 Standard Ethernet-networks use this access method.

    A.   TCP/IP
    B.   Token Ring
    C.   FDDI
    D.   CSMA/CD   (10)

[30]

QUESTION 5
SOCIAL IMPLICATIONS AND THE INTERNET

5.1   The following heading appears in a computer magazine:

"Biometric Security Fences Being Put Around Schools"

Describe an example of how a biometric security system can be used in a school system.   (2)

5.2   When you want to buy a cellphone for use in a business it is important to know terms such as WAP, bluetooth and infrared.

    5.2.1 Describe each of the three mentioned terms.   (6)

    5.2.2 Name an application possible with a GPRS-enabled cellphone.   (1)

5.3   Read the following passage and then answer the questions.

> Internet banking achieved the 1 million mark in South Africa for the first time by the end of 2003.
>
> According to the latest research by World Wide Worx,"Internet banking in South-Africa 2004", the number of Internet bank accounts in South Africa increased by 28% since the previous year, in spite of security problems during 2003.

    5.3.1 Give THREE reasons why such a growth in Internet banking occurred.   (3)

    5.3.2 Which preventative measures are taken in order to ensure safe Internet banking?   (2)

5.4   Name TWO health problems associated with computer usage and name cures to each problem.   (4)

5.5   Name TWO ways to prevent computer viruses from damaging your computer system.   (2)

[20]

ANSWER QUESTIONS ON EITHER DELPHI OR PASCAL.

DELPHI

QUESTION 6

6.1 View the following Delphi procedures and answer the questions that follow.

```
procedure determineage(sBirth:str20; var bAg:byte);
var
   sYear :string;
begin
   sYear := copy(sBirth,1,4);
   bAg := 2005 - strToInt(sYear);
end;

procedure TForm1.ButtonCalculateClick(Sender: TObject);
var
  bAge:byte ;

begin
  determineage(edtDateofbirth.Text,bAge);
  pnlOutput.Caption := edtName.Text[1] + ' ' +
  edtSurname.Text +  ' you are ' + intToSTr(bAge)+
  ' years of age ';
end;
```
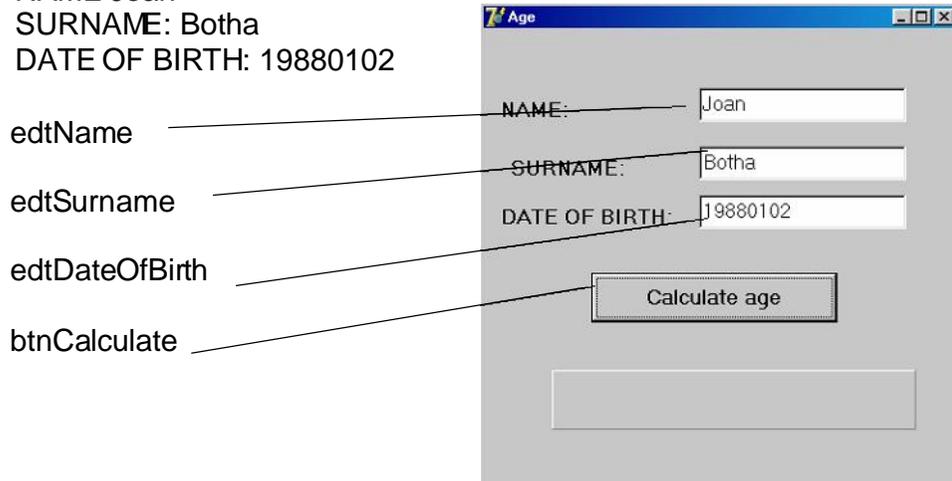
6.1.1 What is the difference between value- and reference parameters? (2)

6.1.2 What shall be displayed on the panel if the [btnCalculate] button is clicked
after the following data is entered:
NAME Joan
SURNAME: Botha
DATE OF BIRTH: 19880102

edtName

edtSurname

edtDateOfBirth

btnCalculate

(3)

6.2   Complete the function that receives a character string and adds the digits in the
       character string, e.g.
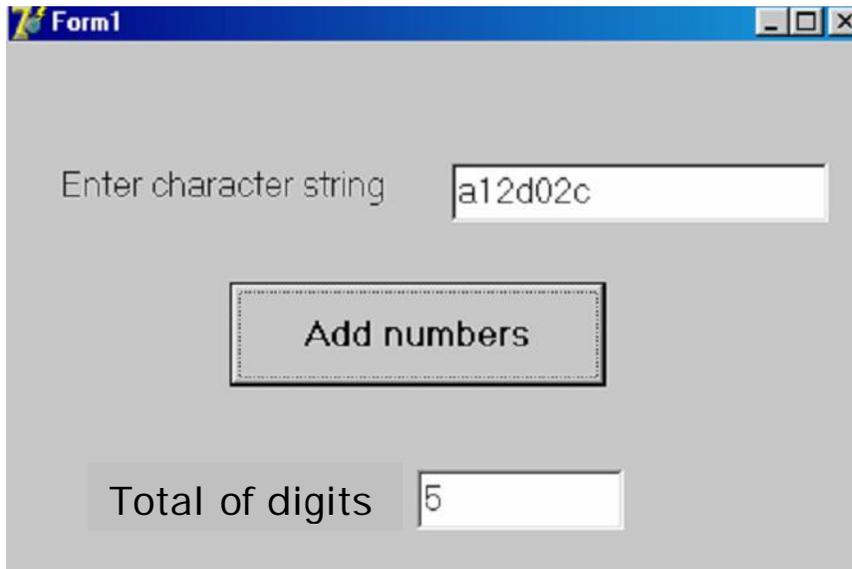

```
unit countnumbers_u;

interface

uses
 Windows, Messages, SysUtils, Variants, Classes, Graphics,
 Controls, Forms,Dialogs, StdCtrls;

type
  TForm1 = class(TForm)
    edtInput: TEdit;
    lblInput: TLabel;
    lblOutput: TLabel;
    edtOutput: TEdit;
    btnCount: TButton;
    procedure btnCountClick(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;

var
  Form1: TForm1;

implementation

{$R *.dfm}

function countcharacters // Complete the function
```

```
end;

procedure TForm1.btnCountClick(Sender: TObject);
var
  sCharacterstring: string;
begin
sCharacterstring := edtInput.Text;
edtOutput.Text := intToStr(countcharacters(sCharacterstring));
end;

end.
```

(10)
[15]

QUESTION 7
DELPHI

7.1   Re-write the following nested if-statement as a Case-statement:

```
If (iTotal > 79)  AND ( iTotal < 90) then
      iQuantityA := iQuantityA + 1
else if iTotal IN [1..79] then
Begin
   iTotal := iTotal + 1;
   iNumber := iTotal;
end

else if iTotal <= 100 then
    iAchievement := iAchievement + 1
else

      lblOutput.Caption := 'Invalid';                    (7)
```

7.2   Give a description of each of the following functions and procedures:
Example: Power
Power uses two numbers and calculates the first number to the power of the second
number.

     7.2.1   TimeToStr   (1)
     7.2.2   Val   (2)
     7.2.3   StrToFloat   (2)
     7.2.4   Random(20)   (1)

7.3   Give TWO differences between a REPEAT and a WHILE-statement.   (2)
[15]

QUESTION 8
DELPHI

The record layout of a data file RECORDS.DAT is as follows:

```
type
 TFRec = record
  name, surname :string[20];
  marks         :array[1..6] of integer;
 end;
```

Complete the procedure that displays the name and surname as well as the average of the six marks for every learner in a *richedit*.

```
procedure TForm1.btnDisplayClick(Sender: TObject);
var
  DataF      :file of TFrec;
  Data       :TFrec;
  k, iSum    :integer;
  rAverage   :real;
begin
   if FileExists('Records.dat') = true then
     begin
        AssignFile( 8.1 );
        Reset( 8.2 );
        While 8.3
        begin
          Read (DataF, Data);
          iSum := 8.4;

          for 8.5
          begin
            8.6;
          end;

          rAverage := iSum/6;

          redOutput.Lines.Add( 8.7 )
        end;
        CloseFile(DataF);
     end
   else
      ShowMessage(' Datafile not created ');
end;
```

[13]

QUESTION 9
DELPHI

9.1 Redraw the table and add the elements that will occur in the table if one clicks on the button.

```
procedure TForm1.Button1Click(Sender: TObject);
var
  k, j       :integer;
  character :char;
begin
 with stringGrid1 dc
 begin
  character := 'D';
  for k := 1 to 3 dc
      for j := 1 to 3 do
       begin
           inc(character);
           cells[k,j] := character;
       end;
 end;
end;
```


(3)

9.2 Study the Delphi code. Use a trace table to determine what will be displayed in the memo component if the following character string is entered: 'Anna eats an apple'. Draw the trace table and use the headings given below.
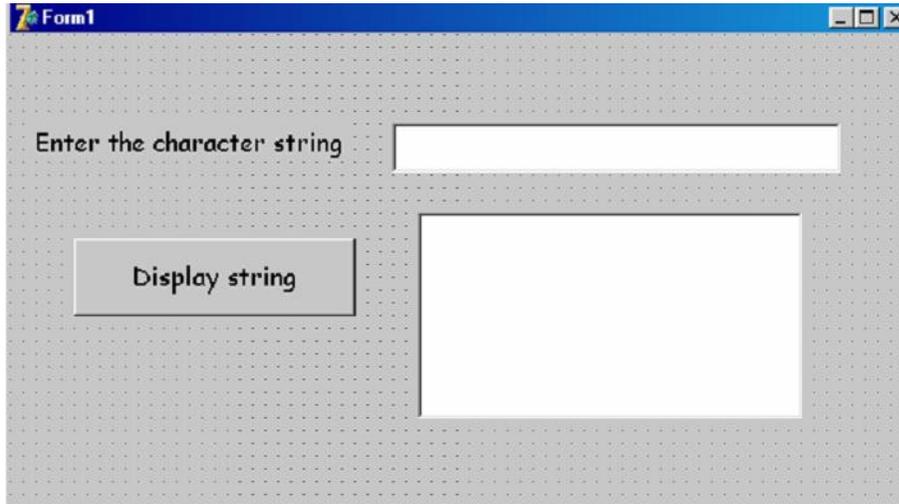

```
procedure TForm1.BtnDisplayStringClick(Sender: TObject);
var
  iPosition :integer;
  sOldstr, sNewstr :string;
begin
  sOldstr := edtString.Text + ' ';
  sNewstr := '';
  iPosition := pos(' ',SOldstr);
  while iPosition > 0 do
  begin
    if (Uppercase(sCldstr[1]) <> 'A') then
      sNewstr := sNewstr + copy(sOldstr,1,iPosition);
      delete(sOldstr,1,iPosition);
      iPosition := pos(' ',sOldstr);
  end;
  memo1.Lines.Add(sNewstr);
end;
```

sOldstr	sNewstr	iPosition	iPosition > 0	(Uppercase(sOldstr[1])<>'A')

(6)

9.3   The uncompleted program below reads a name and displays the name in the
       Richedit-component if it occurs in the textfile Words.txt.
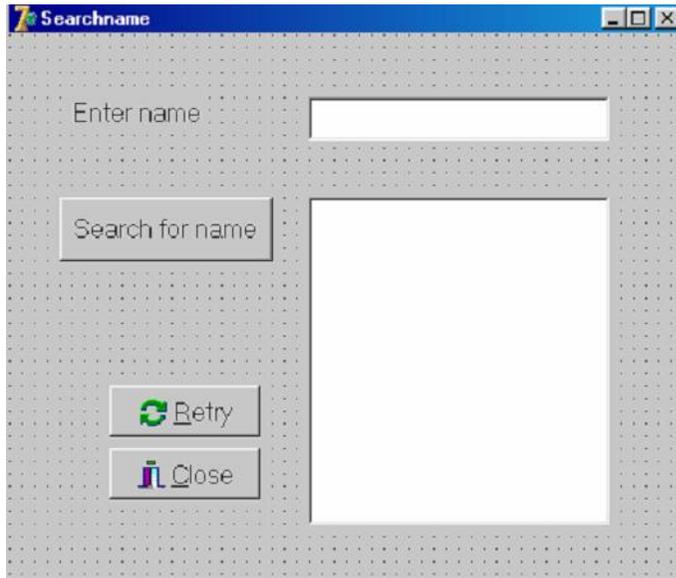

```
procedure TForm1.BtnSearchNameClick(Sender: TObject);
var
   Textafile:
   bTest:                        9.3.3
   sSearchname,sLine:

begin
   sSearchname := edtName.Text;
   assignfile(Textafile,'Words.txt');
   reset(Textafile);
   bTest:= false;
   while not eof(Textafile) do
   begin
     readln(Textafile,sLine);
     if sLine = sSearchname then bTest := true;
   end;
   closeFile(Textafile);
   if bTest then 9.3.5;

end;

procedure TForm1.BitBtn2Click(Sender: TObject);
begin

end;
```

9.3.1   What are a *Memo* and a *Richedit* used for?   (1)

9.3.2   How does a *Memo* differ from a *Richedit*?   (1)

9.3.3 Declare the variables `textafile`, `bTest`, `sSearchname` and `sLine`. (3)

9.3.4 What is the purpose of the variable "`bTest`"? (2)

9.3.5 Complete the statement: `if bTest then ...` (2)

9.3.6 Explain if the program will display the name John in the richedit if it is typed in upper case, while it is not stored in this way in the text file. (2)

9.3.7 Name TWO attributes of text files. (2)

9.4 Write the code for the *Reset*-button. The *Reset*-button deletes the name in the *edit*-component and positions the marker in the *edit*-component. (2)

[24]

QUESTION 10
DELPHI

10.1 Give ONE attribute of an object-oriented program such as Delphi. (1)

10.2 The following Delphi program is given:

```
unit athletics_u;

interface

uses
   Windows, Messages, SysUtils, Variants, Classes,  Graphics,
   Controls, Forms,Dialogs, StdCtrls, ExtCtrls, Buttons;

type
  TForm1 = class(TFom)
    RadField: TRadioGroup;
    btnAdd: TButton;
    btnDelete: TButton;
    edtItem: TEdit;
    bmbReset: TBitBtn;
    procedure FormCreate(Sender: TObject);
    procedure btnAddClick(Sender: TObject);
    procedure btnDeleteClick(Sender: TObject);
    procedure bmbResetClick(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;
```

```
var
  Form1: TForm1;
  iCount : integer;

implementation

{$R *.dfm}

procedure TForm1.FormCreate(Sender: TObject);
begin
  Form1.height := 200;
  iCount := 0;
end;

procedure TForm1.btnAddClick(Sender: TObject);
begin
  RadField.Items.Add(edtItem.Text);
end;

procedure TForm1.btnDeleteClick(Sender: TObject);
var
  iWhere :Integer;
begin
  iWhere := RadField.Items.IndexOf(edtItem.Text);
  if iWhere > -1 then
  begin
      RadField.Items.Delete(iWhere);
      iCount := iCount + 1;
  end;
end;

procedure TForm1.bmbResetClick(Sender: TObject);
begin
  edtItem.Clear;
end;

end.
```

Give an example from the program above of the following:

10.2.1 Component
10.2.2 Global variable
10.2.3 Local variable
10.2.4 Method
10.2.5 Class
10.2.6 Property
10.2.7 Unit   (7)

[8]

TOTAL: 200

OR

P.T.O.

QUESTION 6
PASCAL

6.1   Consider the following Pascal-program and answer the questions:

```pascal
Program question61;
uses crt;

type
  str20 = string[20];

var
 name, surname, born:str20;
 age :byte;

procedure determineage(dborn:str20;var doldness:byte);
var
   year :string;
   code, intyear:integer;

begin
   year := copy(dborn,1,4);
   val(year,intyear,code);
   doldness := 2005 - intyear;
end;

begin
   writeln('Key in the name');
   readln(name);
   writeln('Key in the surname');
   readln(surname);
   writeln('Key in the date of birth yyyymmdd');
   readln(born);
   determineage(born,age);
   writeln(name[1],' ',surname,' you are ',age,' years of age');
end.
```

6.1.1   What is the difference between **value** and **reference parameters**?   (2)

6.1.2   What will the output of the program segment be if the following data is
entered?
NAME: Joan
SURNAME: Botha
DATE OF BIRTH: 19880102   (3)

6.2   Complete the function that receives a character string and adds the digits
in the character string, for example:

a12d02c   Answer: 5 (1 + 2 + 0 + 2)

```
program question62;

uses crt;
var
    characterstring :string;

function  {Complete the function}

begin
  writeln('Enter the characterstring');
  readln(characterstring);
  writeln('The total of the digits are',
  countcharacters(characterstring));
  readln;
end.
```

(10)
[15]

QUESTION 7
PASCAL

7.1   Rewrite the following nested if-statement as a Case statement:

```
If (total > 79)  AND ( total < 90) then
      quantityA := quantityA + 1;
else

If total IN [1..79] then
begin
   total := total + 1;
   number := total;
end

else

if total <= 100 then
    achievement := achievement + 1
else

writeln('Invalid');
```
(7)

7.2   Give a description of each of the following Pascal procedures:

Example: str
This procedure converts a numeric value to a string value.

7.2.1   Highvideo   (1)
7.2.2   Gotoxy   (2)
7.2.3   Truncate   (2)
7.2.4   Random(20)   (1)

7.3 Give TWO differences between a REPEAT and a WHILE-statement. (2)

[15]

QUESTION 8
PASCAL

The record layout of a data file RECORDS.DAT is as follows:

```pascal
type
 Records = record
      name, surname :string[20];
      marks         :array[1..6] of integer;
 end;
```

Complete the procedure that displays the name, surname as well as the average of the six marks for each learner, on the screen.

```pascal
procedure displaycontents;
var
  DataF              :file of Records;
  Data               :Records;
  k, Errorcode, sum  :integer;
  average            :real;
begin
   assign( 8.1 );
   {$I-}
   Reset( 8.2 );
   ErrorCode := IOResult;
   {$I+}
   if Errorcode <> 0 then writeln(' 8.3 ');
Repeat
     Read( DataF, Data );
     sum := 8.4;

     for 8.5
     begin
       8.6;
     end;

     average := Sum/6;
     writeln(8.7);

 Until eof(DataF);

 Close(DataF);
end;
```

[13]

QUESTION 9
PASCAL

9.1   What will be displayed on the screen if the following program is executed?

```
program question91;
uses crt;

var
  k,j          :integer;
  character    :char;
  cells        :array[1..3,1..3] of char;

begin
 character := 'D';
 for k := 1 to 3 do
  for j := 1 to 3 dc
  begin
    inc(character);
    cells[k,j] := character;
  end;
 clrscr;
 for k := 1 to 3 dc
 begin
 for j := 1 to 3 dc
    begin
      write(cells[k,j],' ');
    end;
  writeln;
 end;
 readln;
end.
```
                                                                                    (3)

9.2   Consider the following Pascal program. Use a trace table to determine what will
      be displayed on the screen if the following character-string is entered: 'Anna eats
      an apple'. Draw the trace table and use the given headings.

```
program question92;
uses crt;
type
  str40 = string[40];
var
  oldstring :str40;

procedure determine(oldstr:str40);
var
  position :integer;
  newstr :string;
begin
  oldstr := oldstr + ' ';
  newstr := '';
```

```
      position := pos(' ',oldstr);
      while position > 0 do
      begin
         if (Upcase(oldstr[1]) <> 'A') then
           newstr := newstr + copy(oldstr,1,position);
           delete(oldstr,1,position);
           position := pos(' ',oldstr);
       end;
       writeln(newstr);
   end;
   begin
     writeln('Enter the characterstring');
     readln(oldstring);
     bepaal(oldstring);
     readln;
   end.
```

oldstr	newstr	position	position > 0	(Upcase(oldstr[1])<>'A')

(6)

9.3 The uncompleted program below reads a name and prints an appropriate message if the name occurs in the textfile Words.txt.

```
program question93;

uses crt;

var
  textafile:
  test:                    9.3.1
  searchname, line:


begin
  assign(textafile,'Words.txt');
  reset(textafile);
  writeln('Which name are you searching for?');
  readln(searchname);
  test:= false;
  while not eof(textafile) do
  begin
     readln(textafile,line);
     if line = searchname then test := true;
  end;
  close(textafile);
  if test then 9.3.3;
readln;
end.
```

9.3.1   Declare the variables `textafile, test, searchname` and `line`.   (3)

9.3.2   What is the purpose of the variable `test`?   (2)

9.3.3   Complete the statement: `if test then …`   (2)

9.3.4   Explain if the program will display John on the screen if it is entered in upper case, while it is not stored likewise in the text file.   (2)

9.3.5   Name TWO attributes of text files.   (2)

9.4   Write Pascal-code to add a name to the end of the textfile. You need not declare variables.   (4)

[24]

QUESTION 10
PASCAL

Consider the following program and then answer the questions.

```
program question10;
uses crt, displaycolours;

var
 k:                   10.3.1;
 quantitycolours: 10.3.2;
 arraya1:            10.3.3;
 arraya2:            10.3.4;

begin
{1}  quantitycolours := red;
{2}  inc(quantitycolours);
{3}  writeln(ord(quantitycolours));
{4}  display(quantitycolours);
{5}  k := 1;
{6}  for quantitycolours := yellow to purple do
{7}  begin
{8}     arraya2[quantitycolours] := k;
{9}  end;
{10} quantitycolours := yellow;
{11} for k := 1 to 5 do
{12} begin
{13}     arraya1[k] := quantitycolours;
{14}     inc(quantitycolours);
{15} end;
{16} readln;
{17} end.
```

10.1   The following type statement is stored in the unit:

```
type
      colours = (yellow,green,red,blue,purple);
```

What is the name of the Unit file?   (1)

10.2   Which procedure is stored in the unit?   (1)

10.3   Give the data type of each of the following variables:

10.3.1   k
10.3.2   quantitycolours
10.3.3   arraya1
10.3.4   arraya2   (4)

10.4   Which output will be given by statement {3} if the program is executed?   (1)

10.5   Except for INTEGER and LONGINT, name another ordinal data type.   (1)

                                                                                       [8]

                                                             TOTAL: 200

END