



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE12

INFORMATION TECHNOLOGY P1

NOVEMBER 2018

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 23 pages.

GENERAL INFORMATION:

- These marking guidelines must be used as the basis for the marking session. They were prepared for use by markers. All markers are required to attend a rigorous standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' work.
- Note that learners who provide an alternate correct solution to that given as example of a solution in the marking guidelines will be given full credit for the relevant solution, unless the specific instructions in the question paper were not followed or the requirements of the question were not met.
- **Annexures A, B, C and D** (pages 3–9) include the marking grid for each question and a table for a summary of the learner's marks.
- **Annexures E, F, G and H** (pages 10–23) contain examples of a programming solution for **QUESTION 1** to **QUESTION 4** in programming code.
- Copies of **Annexures A, B, C, D** and the **summary of learner's marks** (pages 3–9) should be made for each learner and completed during the marking session.

ANNEXURE A**SECTION A****QUESTION 1: MARKING GRID – GENERAL PROGRAMMING SKILLS**

CENTRE NUMBER:		EXAMINATION NUMBER:	
QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
<i>A learner must be penalised only once if the same error is repeated.</i>			
1.1	Button [1.1 – Display heading] Set the panel colour to lime ✓ Set the font colour to red ✓ Set the font size to 20 pt ✓ Set the panel caption to 'Information Technology Paper 1' ✓	4	
1.2	Button [1.2 – Volume] Declaration of radius and height variables ✓ Extract the height and radius from the edit ✓ Convert both to real values ✓ Calculate volume $\pi * \sqrt{rRadius} * (rHeight - 1)$ ✓ Display message ✓ and value ✓ formatted to one decimal ✓	9	
1.3	Button [1.3 – Display factors] Declaration of suitable variables ✓ Clear the rich edit output area ✓ Initialise factor counter ✓ Randomly generate number ✓ between 5 and 50 ✓ Loop from 1 to random number ✓ Test if number ✓ modulus loop variable is 0 ✓ Display the value of the loop variable ✓ Increment factor counter ✓ Test if number of factors = 2 ✓ Display the random number ✓ and a message to indicate value is prime number ✓	13	
1.4	Button [1.4 – Enter line and display commands] Display line of instructions ✓ and a blank line ✓ Initialise steps counter to 0 ✓ While/For loop from 1 ✓ to length of line ✓ AND Number of steps ≤ 10 /break when > 10 ✓ Extract character from line at loop-index position ✓ Use CASE or multiple IF's to test 3 characters IF 'S' Increment number of steps by 1 ✓ display command "Step forward" ✓ Test if number of steps > 10 ✓ set message to "Number of forward steps more than 10" ✓ IF 'R' set message to "Turn right" ✓ IF 'L' set message to "Turn left" ✓ Display message ✓ End loop	14	
TOTAL SECTION A		40	

ANNEXURE B**SECTION B****QUESTION 2: MARKING GRID - DATABASE PROGRAMMING**

CENTRE NUMBER:		EXAMINATION NUMBER:	
QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
2.1.1	Button [2.1.1 – Alphabetical list]	3	
	SQL: SELECT * FROM tblEmployees ORDER BY Surname ASC		
	Concepts: SELECT all fields ✓ FROM Correct table ✓ ORDER BY correct field ✓		
2.1.2	Button [2.1.2 – Number of children of permanent employees]	5	
	SQL: SELECT Surname, FirstName, Children FROM tblEmployees WHERE Children > 3 AND Permanent = TRUE		
	Concepts: SELECT all the correct fields ✓ FROM correct table ✓ WHERE Conditions: Children > 3 ✓ AND ✓ Permanent = TRUE ✓		
2.1.3	Button [2.1.3 – Employees paid on selected date]	6	
	SELECT PaymentNumber, IDNumber FROM tblEmployees E, tblPayments P WHERE E.EmployeeNumber = P.EmployeeNumber AND PaymentDate = #2017/01/17#		
	Concepts: SELECT correct fields; ✓ FROM tblEmployees ✓, tblPayments ✓ WHERE clause to link tables ✓ AND ✓ correct condition ✓		
2.1.4	Button [2.1.4 – Delete payment]	3	
	DELETE * FROM tblPayments WHERE PaymentNumber = 110		
	Concepts: DELETE ✓ FROM correct table ✓ WHERE correct condition ✓		

QUESTION 2: MARKING GRID – CONTINUE

2.1.5	Button [2.1.5 – Total net salaries per month]	8	
	SQL: SELECT Month(PaymentDate) as MonthNum, FORMAT(SUM(GrossSalary-Deductions), "Currency") AS TotalAmountPaid FROM tblPayments GROUP BY Month(PaymentDate)		
	Concepts: SELECT correct field; MONTH-function ✓ AS variable ✓; SUM ✓; calculation ✓; currency format ✓; FROM correct table ✓ GROUP BY ✓ Month(PaymentDate) ✓		
	Subtotal: SQL	[25]	
2.2.1	Button [2.2.1 – Temporary employees] Move to first record of tblEmployees table ✓ Loop while not end of table ✓ IF Permanent = false ✓ Display the surname, first name ✓ with tabs ✓ in <i>richedit</i> Move to next record ✓	6	
2.2.2	Button [2.2.2 – Add an employee] Place table in INSERT mode ✓ Assign correct String values to the various data fields ✓ Assign correct boolean value to the correct data field ✓ Assign correct integer value to the correct data field ✓ POST the updated field values ✓	5	
2.2.3	Button [2.2.3 – Update deductions] Place table in EDIT mode ✓ Update the deductions field ✓ with 1% of gross salary ✓ POST the updated field value ✓	4	
	Subtotal: Code constructs	[15]	
	TOTAL SECTION B	40	

ANNEXURE C**SECTION C****QUESTION 3: MARKING GRID – OBJECT-ORIENTATED PROGRAMMING**

CENTRE NUMBER:		EXAMINATION NUMBER:	
QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
3.1.1	Constructor: Heading ✓ with three values with two String parameters, ✓✓one integer ✓ Assign parameter values to attributes ✓	5	
3.1.2	getNumEmployees METHOD: Heading with correct data type ✓ Result statement ✓	2	
3.1.3	increaseNumEmployees METHOD: Procedure name and parameter ✓ fNumEmployees = fNumEmployees✓ + parameter value ✓	3	
3.1.4	compileCode METHOD: Method(Function) heading with String data type ✓ Correct parameter with data type ✓ Code ← first letter of name of restaurant ✓ + last two letters ✓ of owner name ✓ + year opened ✓ Result statement ✓	7	
Subtotal: Object class		[17]	

QUESTION 3: MARKING GRID – CONTINUE

QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
3.2.1	Button [3.2.1 – Instantiate and display object] Instantiate object Object name = ✓ classname.create ✓ with arguments name of restaurant, ✓ year opened, ✓ and number of employees ✓ Display the object RichEdit component for display ✓ Object name ✓ toString ✓	8	
3.2.2	Button [3.2.2 – Identification code] Call compile code method ✓ owner name as parameter ✓ Display the code in the edit box ✓	3	
3.2.3	Button [3.2.3 – Add employees] Extract the number of employees to add ✓ Test if the current number of employees ✓ + employees to add ✓ <= max number of employees ✓ Call the increaseNumEmployees method ✓ with correct parameter value ✓ Display the updated value ✓ for the number of employees in the edit box ✓ Else ✓ Display a suitable message in the edit box ✓	10	
	Subtotal: Form class	[21]	
	TOTAL SECTION C	38	

ANNEXURE D**SECTION D****QUESTION 4: MARKING GRID – PROBLEM-SOLVING**

CENTRE NUMBER:		EXAMINATION NUMBER:	
Question	DESCRIPTION	MAX MARKS	LEARNER'S MARKS
4.1	Button [4.1 – Populate Customer array] Read month from combo box✓ Initialise global counter for days in month✓ Assign✓ and reset file✓ Loop through file✓ Read line✓ Test if the line has the selected month✓ Increment global counter✓ Find the position of #✓ Copy number of customers✓ Convert to integer ✓and store in arrCustomers✓ using the days in month global variable as index✓ end Loop Display message to indicate array were successfully populated✓	14	
4.2	Button [4.2 – Display] Read day of week index from combo box✓ and assign to variable Set counter for date to 1✓ Loop from 1 to day of week index ✓ compile line with tab spaces✓ Loop while date counter <=✓ to number of days in month✓ If date counter + 7 <=✓ number of days in month ✓ Set weekLoop counter to 7 – day of week variable ✓ Else✓ Set weekLoop to number of days in month – date counter+1 ✓ Loop from 1 to weekLoop counter✓ Compile output String with dates and number of customers ✓ Increment date counter✓ Display output String✓ Initialize empty String for output✓ Set day of week variable to 0✓ Data displayed in columns✓ Concepts tested: Read day of week index //1 Initialize counter for date //1 Determine number of weeks (rows) //3 Loop the correct number of times for weeks //1 Add spaces to output String to start at correct day //3 Loop for correct number of days //3 Compile String with dates and number of customers //1 Increment date counter //1 Display output String //1 Reset output String to empty String //1 Reset day of week variable to 0 //1 Display in columns //1	18	
	TOTAL SECTION D	32	

SUMMARY OF LEARNER'S MARKS:

CENTRE NUMBER:		EXAMINATION NUMBER:			
	SECTION A	SECTION B	SECTION C	SECTION D	
	QUESTION 1	QUESTION 2	QUESTION 3	QUESTION 4	GRAND TOTAL
MAX. MARKS	40	40	38	32	150
LEARNER'S MARKS					

ANNEXURE E: SOLUTION FOR QUESTION 1

```

unit Question1_U;
interface
uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs, ComCtrls, ExtCtrls, StdCtrls, Math, Buttons;
type
  TfrmQ1 = class(TForm)
    pgcQ1: TPageControl;
    tbsQuestion1_1: TTabSheet;
    tbsQuestion1_2: TTabSheet;
    tbsQuestion1_3: TTabSheet;
    pnlQ1_1: TPanel;
    btnQ1_3: TButton;
    tbsQuestion1_4: TTabSheet;
    btnQ1_4: TButton;
    redQ1_3: TRichEdit;
    pnlBtns: TPanel;
    bmbClose: TBitBtn;
    Label1: TLabel;
    redQ1_4: TRichEdit;
    Label3: TLabel;
    Label4: TLabel;
    edtHeight: TEdit;
    edtRadius: TEdit;
    btnQ1_2: TButton;
    Label5: TLabel;
    Label6: TLabel;
    procedure pnlQ1_1Click(Sender: TObject);
    procedure btnQ1_2Click(Sender: TObject);
    procedure btnQ1_3Click(Sender: TObject);
    procedure btnQ1_4Click(Sender: TObject);
    procedure FormCreate(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;
var
  frmQ1: TfrmQ1;
implementation
{$R *.dfm}
// =====
// Question 1.1 (4 marks)
// =====
procedure TfrmQ1.pnlQ1_1Click(Sender: TObject);
begin
  pnlQ1_1.Color := clLime;
  pnlQ1_1.Font.Color := clRed;
  pnlQ1_1.Font.Size := 20;
  pnlQ1_1.caption := 'Information Technology Paper 1';
end;
// =====
// Question 1.2 (9 marks)
// =====
procedure TfrmQ1.btnQ1_2Click(Sender: TObject);
var
  rRadius, rHeight: real;
  rLiquidVol: real;
begin
  rRadius := StrToFloat(edtRadius.Text);
  rHeight := StrToFloat(edtHeight.Text);

```

NSC – Marking Guidelines

```

    rLiquidVol := pi * sqr(rRadius) * (rHeight - 1);
    ShowMessage('The volume is ' + FloatToStrF(rLiquidVol, ffFixed, 5, 1));
end;
// =====
// Question 1.3          (13 marks)
// =====
procedure TfrmQ1.btnQ1_3Click(Sender: TObject);
var
    iNumber, I, iNumFactors: integer;
begin
    redQ1_3.Clear;
    iNumFactors := 0;
    iNumber := Random(50 - 5 + 1) + 5;
    for I := 1 to iNumber do
    begin
        if iNumber mod I = 0 then
        begin
            redQ1_3.Lines.Add(IntToStr(I));
            Inc(iNumFactors);
        end;
    end;
    if iNumFactors = 2 then
        redQ1_3.Lines.Add(#13 + IntToStr(iNumber) + ' is a prime number');
end;
// =====
// Question 1.4          (14 marks)
// =====
procedure TfrmQ1.btnQ1_4Click(Sender: TObject);
var
    sCommandLine, sCommand: String;
    sChar: char;
    i, iNumSteps: integer;
begin
    // Provided code
    sCommandLine := upperCase(InputBox('Robot instructions',
        'Enter a line of instructions', 'SSSRSLSLSSR'));
    redQ1_4.Lines.Clear;
// =====
    redQ1_4.Lines.Add(sCommandLine);
    redQ1_4.Lines.Add('');
    iNumSteps := 0;
    i := 1;
    while (i <= length(sCommandLine)) AND (iNumSteps <= 10) do
    begin
        sChar := sCommandLine[i];

        case sChar of
            'S': begin
                Inc(iNumSteps);
                sCommand := 'Step forward';
                if iNumSteps > 10 then
                    sCommand := 'Number of forward steps more than 10';
                end;
            'L': sCommand := 'Turn left';
            'R': sCommand := 'Turn right';
        end;
        redQ1_4.Lines.Add(sCommand);

        Inc(i);
    end;

    // Alternative solution
    { for i := 1 to length(sCommandLine) do

```

```
begin
  sChar := sCommandLine[i];
  case sChar of
    'S': begin
      Inc(iNumSteps);
      sCommand := 'Step forward';
      if iNumSteps > 10 then
        sCommand := 'Number of forward steps exceeds 10';
      end;
    'L': sCommand := 'Turn left';
    'R': sCommand := 'Turn right';
  end;
  redQ1_4.Lines.Add(sCommand);

  if iNumSteps > 10 then
    break;
  end;
}
end;

// -----
{$REGION 'Provided code - Do not modify'}
procedure TfrmQ1.FormCreate(Sender: TObject);
begin
  pgcQ1.ActivePageIndex := 0;
  CurrencyString := 'R';
end;
{$ENDREGION}
end.
```

ANNEXURE F: SOLUTION FOR QUESTION 2

```

unit Question2_U;
// --- Delphi and Database programming -----
//
// Possible solution for Question 2.
// -----
interface
uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs, StdCtrls, Buttons, ExtCtrls, ConnectDB_U, DB, ADODB, Grids,
  DBGrids, ComCtrls, DateUtils, DBCtrls;
type
  TfrmDBQuestion2 = class(TForm)
    pnlBtns: TPanel;
    bmbClose: TBitBtn;
    bmbRestoreDB: TBitBtn;
    grpTblPayments: TGroupBox;
    grpTblEmployees: TGroupBox;
    dbgEmployees: TDBGrid;
    dbgPayments: TDBGrid;
    tabsQ2_2ADO: TTabSheet;
    tabsQ2_1SQL: TTabSheet;
    btnQ2_2_1: TButton;
    redQ2: TRichEdit;
    grpresults: TGroupBox;
    dbgrdSQL: TDBGrid;
    grpOutput: TGroupBox;
    pgcTabs: TPageControl;
    pnlTables: TPanel;
    btnQ2_1_1: TButton;
    btnQ213: TButton;
    btnQ212: TButton;
    btnQ2_1_4: TButton;
    btnQ2_1_5: TButton;
    btnQ2_2_2: TButton;
    btnQ2_2_3: TButton;
    procedure bmbRestoreDBClick(Sender: TObject);
    procedure FormCreate(Sender: TObject);
    procedure FormClose(Sender: TObject; var Action: TCloseAction);
    procedure btnQ2_1_1Click(Sender: TObject);
    procedure btnQ213Click(Sender: TObject);
    procedure btnQ212Click(Sender: TObject);
    procedure btnQ2_1_4Click(Sender: TObject);
    procedure btnQ2_1_5Click(Sender: TObject);
    procedure btnQ2_2_1Click(Sender: TObject);
    procedure btnQ2_2_2Click(Sender: TObject);
    procedure btnQ2_2_3Click(Sender: TObject);
  private
  public
  end;

var
  frmDBQuestion2: TfrmDBQuestion2;
  dbCONN: TConnection;
  // Provided global variables

  tblEmployees, tblPayments : TADOTable;

implementation
{$R *.dfm}
{$R+}
{$Region 'Question 2.1 - SQL SECTION'}

```

NSC – Marking Guidelines

```

// =====
// Question 2.1.1 (3 marks)
// =====
procedure TfrmDBQuestion2.btnQ2_1_1Click(Sender: TObject);
var
    sSQL1: String;
begin
    sSQL1 := 'SELECT * FROM tblEmployees ORDER BY Surname ASC';
    // Provided code - do not change
    dbCONN.runSQL(sSQL1);
end;
// =====
// Question 2.1.2 (5 marks)
// =====
procedure TfrmDBQuestion2.btnQ212Click(Sender: TObject);
var
    sSQL2: String;
begin
    sSQL2 := 'SELECT Surname, FirstName, Children '+
        'FROM tblEmployees WHERE Children > 3 AND Permanent = TRUE';
    // Provided code - do not change
    dbCONN.runSQL(sSQL2);
end;
// =====
// Question 2.1.3 (6 marks)
// =====
procedure TfrmDBQuestion2.btnQ213Click(Sender: TObject);
var
    sSQL3: String;
begin
    sSQL3 := 'SELECT PaymentNumber, IDNumber FROM tblEmployees E, tblPayments P
        '+ 'WHERE E.EmployeeNumber = P.EmployeeNumber AND PaymentDate =
            #2017/01/17#';
    // Provided code - do not change
    dbCONN.runSQL(sSQL3);
end;
// =====
// Question 2.1.4 (3 marks)
// =====
procedure TfrmDBQuestion2.btnQ2_1_4Click(Sender: TObject);
var
    sSQL4: String;
begin
    sSQL4 := 'DELETE * FROM tblPayments WHERE PaymentNumber = 110';
    // Provided code - do not change
    dbCONN.executeSQL(sSQL4, dbgPayments);
end;
// =====
// Question 2.1.5 (8 marks)
// =====
procedure TfrmDBQuestion2.btnQ2_1_5Click(Sender: TObject);
var
    sSQL5: String;
begin
    sSQL5 := 'SELECT Month(PaymentDate) as MonthNum, '+
        'FORMAT(SUM(GrossSalary-Deductions), "Currency") AS TotalAmountPaid '
        + 'FROM tblPayments GROUP BY Month(PaymentDate)';
    // Provided code - do not change
    dbCONN.runSQL(sSQL5);
end;
{$EndRegion}
{$Region 'Question 2.2 - Delphi section'}

```

```

// =====
// Question 2.2.1 (6 marks)
// =====
procedure TfrmDBQuestion2.btnQ2_2_1Click(Sender: TObject);
begin
  // Provided code
  redQ2.Clear;
  redQ2.Paragraph.TabCount := 2;
  redQ2.Paragraph.Tab[0] := 80;
  redQ2.Paragraph.Tab[1] := 150;
  redQ2.Lines.Add('Temporary employees');
  redQ2.SelAttributes.Style := [fsBold, fsUnderline];
  redQ2.Lines.Add('Surname' + #9 + 'Firstname' + #9 + 'Children');

  // Add your code here
  tblEmployees.First;
  while not tblEmployees.Eof do
  begin
    if (tblEmployees['Permanent'] = False) then
    begin
      redDisplay.Lines.Add(tblEmployees['Surname'] + #9 +
        tblEmployees['FirstName'] + #9 + IntToStr(tblEmployees['Children']));
    end;
    tblEmployees.Next;
  end;
  // Alternative solution
  // tblEmployees.First;
  // while not tblEmployees.Eof do
  // begin
  //   if (tblEmployees.FieldName('Permanent').AsBoolean = False) then
  //   begin
  //     redDisplay.Lines.Add(tblEmployees.FieldName('Surname').AsString
  //       + #9 + tblEmployees.FieldName('FirstName').AsString
  //       + #9 + tblEmployees.FieldName('Children').AsString);
  //   end;
  //   tblEmployees.Next;
  // end;
end;
// =====
// Question 2.2.2 (5 marks)
// =====
procedure TfrmDBQuestion2.btnQ2_2_2Click(Sender: TObject);
begin
  tblEmployees.Insert;
  tblEmployees['Surname'] := 'Zwelini';
  tblEmployees['Firstname'] := 'Lungile';
  tblEmployees['IDNumber'] := '7601050179081';
  tblEmployees['Permanent'] := True;
  tblEmployees['Children'] := 3;
  tblEmployees.Post;
  // Alternative solution
  // tblEmployees.Insert;
  // tblEmployees.FieldName('Surname').AsString := 'Zwelini';
  // tblEmployees.FieldName('Firstname').AsString := 'Lungile';
  // tblEmployees.FieldName('IDNumber').AsString := '7601050179081';
  // tblEmployees.FieldName('Permanent').AsBoolean := True;
  // tblEmployees.FieldName('Children').AsInteger := 3;
  // tblEmployees.Post;
end;

```

```
// =====  
// Question 2.2.3 (4 marks)  
// =====  
procedure TfrmDBQuestion2.btnQ2_2_3Click(Sender: TObject);  
begin  
    tblPayments.Edit;  
    tblPayments['Deductions'] := tblPayments['Deductions'] + tblPayments  
        ['GrossSalary'] * 0.01;  
    tblPayments.Post;  
  
    // Alternative solution  
    // tblPayments.Edit;  
    // tblPayments.FieldName('Deductions').AsFloat :=  
    //     tblPayments.FieldName('Deductions').AsFloat +  
    //     (tblPayments.FieldName('GrossSalary').AsFloat * 0.01);  
    // tblPayments.Post;  
end;  
  
//===== { $EndRegion }  
  
{ $REGION 'Setup DB connections - DO NOT CHANGE!' }  
// =====  
procedure TfrmDBQuestion2.bmbRestoreDBClick(Sender: TObject);  
begin  
    dbCONN.RestoreDatabase(dbgEmployees, dbgPayments, dbgrdSQL);  
    redQ2.Clear;  
    tblEmployees := dbCONN.tblOne;  
    tblPayments := dbCONN.tblMany;  
end;  
  
procedure TfrmDBQuestion2.FormClose(Sender: TObject; var Action: TCloseAction);  
begin  
    dbCONN.dbDisconnect;  
end;  
  
procedure TfrmDBQuestion2.FormCreate(Sender: TObject);  
begin  
    CurrencyString := 'R';  
    dbCONN := TConnection.Create;  
    dbCONN.dbConnect;  
    tblEmployees := dbCONN.tblOne;  
    tblPayments := dbCONN.tblMany;  
    dbCONN.setupGrids(dbgEmployees, dbgPayments, dbgrdSQL);  
    pgcTabs.ActivePageIndex := 0;  
end;  
// =====  
{ $ENDREGION }  
end.
```


ANNEXURE G: SOLUTION FOR QUESTION 3**OBJECT CLASS:**

```
// Possible solution for Question 3.1
unit Restaurant_U;
interface
uses
  SysUtils, DateUtils;
type
  TRestaurant = class(TObject)
  private
    { Private declarations }

    fName: String;
    fYearOpened: String;
    fNumEmployees: integer;

  public
    { Public declarations }
    constructor Create(sName, sYearOpened: String; iNumEmployees: integer);
    function toString: String;
    function getNumEmployees: integer;
    function compileCode(sOwner: String): String;
    procedure increaseNumEmployees(iValue:integer);
  end;

implementation

{ TRestaurant }

//=====
// Question 3.1.1 (5 marks)
//=====
constructor TRestaurant.Create(sName, sYearOpened: String;
  iNumEmployees: integer);
begin
  fName := sName;
  fYearOpened := sYearOpened;
  fNumEmployees := iNumEmployees;
end;

//=====
// Question 3.1.2 (2 marks)
//=====
function TRestaurant.getNumEmployees: integer;
begin
  Result := fNumEmployees;
end;

//=====
// Question 3.1.3 (3 marks)
//=====
procedure TRestaurant.increaseNumEmployees(iValue: integer);
begin
  fNumEmployees := fNumEmployees + iValue;
end;
```

```
//=====
// Question 3.1.4 (7 marks)
//=====
function TRestaurant.compileCode(sOwner: String): String;
Var
  sCode: String;
begin
  sCode := fName[1] + Copy(sOwner,length(sOwner)-1) + fYearOpened;
  Result := sCode;
end;

//=====
// Provided code - toString
//=====
function TRestaurant.toString: String;
var
  sResult: String;
begin
  sResult := 'Restaurant name: ' + fName + #13 + 'Year opened: ' +
    fYearOpened + #13 + 'Number of employees: ' + intToStr(fNumEmployees)
    + #13;
  Result := sResult;
end;

end.
```

MAIN (APPLICATION) CLASS:

```
// Possible solution for Question 3.2

unit Question3_U;

interface

uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics,
  Controls, Forms, Dialogs, StdCtrls, Restaurant_U,
  ComCtrls, ExtCtrls, jpeg, Spin;

type
  TfrmQ3 = class(TForm)
    GroupBox1: TGroupBox;
    Label1: TLabel;
    Label3: TLabel;
    edtCompanyName: TEdit;
    btnQ3_2_1: TButton;
    GroupBox2: TGroupBox;
    btnQ3_2_2: TButton;
    Label5: TLabel;
    edtOwnerName: TEdit;
    edtIDCode: TEdit;
    edtYearOpened: TEdit;
    Label2: TLabel;
    spnNumEmployees: TSpinEdit;
    GroupBox4: TGroupBox;
    edtAdd: TEdit;
    Label6: TLabel;
    btnQ3_2_3: TButton;
    Label7: TLabel;
    edtUpdated: TEdit;
    redQ3: TRichEdit;
    procedure btnQ3_2_1Click(Sender: TObject);
    procedure btnQ3_2_2Click(Sender: TObject);
    procedure FormShow(Sender: TObject);
    procedure btnQ3_2_3Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;
var
  frmQ3: TfrmQ3;
  // Provided code
  objRestaurant: TRestaurant;

implementation
{$R *.dfm}

//=====
// Question 3.2.1 (8 marks)
// =====
procedure TfrmQ3.btnQ3_2_1Click(Sender: TObject);
begin
  redQ3.Clear;//Provided code
  objRestaurant := TRestaurant.Create(edtCompanyName.Text,
    trim(edtYearOpened.Text), spnNumEmployees.value);
  redQ3.Lines.Add(objRestaurant.ToString);
end;
```

```
// =====  
// Question 3.2.2 (3 marks)  
// =====  
procedure TfrmQ3.btnQ3_2_2Click(Sender: TObject);  
begin  
    edtIdCode.Text := objRestaurant.compileCode(edtOwnerName.Text);  
end;  
  
// =====  
// Question 3.2.3 (10 marks)  
// =====  
procedure TfrmQ3.btnQ3_2_3Click(Sender: TObject);  
//Provided declaration  
const  
    iMaxEmployees = 40;  
Var  
    iNumEmplToAdd:integer;  
begin  
  
    iNumEmplToAdd := StrToInt(edtAddEmployees.Text);  
    if objRestaurant.getNumEmployees + iNumEmplToAdd <= iMaxEmployees then  
        begin  
            objRestaurant.increaseNumEmployees(iNumEmplToAdd);  
            edtUpdatedEmployees.Text := IntToStr(objRestaurant.getNumEmployees);  
        end  
    else  
        begin  
            edtUpdatedEmployees.Text := 'Exceeds max';  
        end;  
end;  
  
//Provided code  
procedure TfrmQ3.FormShow(Sender: TObject);  
begin  
    btnQ3_2_1.SetFocus;  
end;  
end.
```

ANNEXURE H: SOLUTION FOR QUESTION 4

```
// A possible solution for Question 4
unit Question4_U;
interface
uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs, StdCtrls, ComCtrls, ExtCtrls, Math, Buttons;
type
  TfrmQ4 = class(TForm)
    btnQ4_1: TButton;
    cmbDays: TComboBox;
    cmbMonths: TComboBox;
    btnQ4_2: TButton;
    Panel1: TPanel;
    Label1: TLabel;
    Panel2: TPanel;
    redQ4: TRichEdit;
    Label2: TLabel;
    bmbClose: TBitBtn;
    procedure btnQ4_1Click(Sender: TObject);
    procedure btnQ4_2Click(Sender: TObject);
    procedure FormCreate(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;
  // Provided code - declarations
const
  arrDays: array [1 .. 7] of String = ('Sun', 'Mon', 'Tue', 'Wed', 'Thu',
    'Fri', 'Sat');
  arrTempCustomers: array [1 .. 31] of integer = (248, 81, 189, 141, 163, 163,
    233, 64, 145, 188, 108, 124, 120, 130, 57, 64, 131, 54, 138, 71, 75, 152,
    126, 170, 56, 157, 230, 82, 199, 119, 136);
var
  frmQ4: TfrmQ4;
  arrCustomers: array [1 .. 31] of integer;

  // User declarations
  iDaysInMonth: integer = 0;
implementation
{$R *.dfm}
{$R+}
// =====
// Question 4.1 (14 marks)
// =====
procedure TfrmQ4.btnQ4_1Click(Sender: TObject);
var
  tFile: TextFile;
  sLine, sMonth: String;
  iPos : integer;
begin
  iDaysInMonth := 0;
  sMonth := cmbMonths.Text;
  AssignFile(tFile, 'Visitors.txt');
  Reset(tFile);
  while NOT EOF(tFile) do
  begin
    Readln(tFile, sLine);
    if Pos(sMonth, sLine) > 0 then
    begin
      inc(iDaysInMonth, 1);
    end;
  end;
end;
```

NSC – Marking Guidelines

```

        iPos := pos('#',sLine);
        arrCustomers[iDaysInMonth] := StrToInt(copy(sLine, iPos+1,
            length(sLine)));
    end;
end;
ShowMessage('Array successfully populated.');
```

```

end;
// =====
// Question 4.2 (18 marks)
// =====
procedure TfrmQ4.btnQ4_2Click(Sender: TObject);
var
    iCnt, iDate: integer;
    sOutput: String;
    iRow, iDayOfWeek, iCol, iWeekLoop: integer;
    sLine: String;
    iNumRows: integer;
begin
    // Provided code
    redQ4.Clear;
    redQ4.SelAttributes.Style := [fsBold];
    redQ4.Lines.Add('Calendar for ' + cmbMonths.Text + #13);
    sOutput := '';
    for iCnt := 1 to 7 do
        begin
            sOutput := sOutput + arrDays[iCnt] + #9;
        end;
    redQ4.SelAttributes.Style := [fsBold];
    redQ4.Lines.Add(sOutput);

    // Question 4.2 - Type your code here
    iDayOfWeek := cmbDays.ItemIndex;
    iDate := 1;
    for iCol := 1 to iDayOfWeek do
        begin
            sLine := sLine + ' ' + #9;
        end;
    while (iDate <= iDaysInMonth) do
        begin
            if (iDate + 7) <= iDaysInMonth then
                iWeekLoop := 7 - iDayOfWeek
            else // 1
                iWeekLoop := iDaysInMonth - iDate + 1;

            for iCnt := 1 to iWeekLoop do
                begin
                    sLine := sLine + IntToStr(iDate) + ' (' + IntToStr(arrCustomers[iDate])
                        + ')' + #9;
                    inc(iDate);
                end;
            redQ4.Lines.Add(sLine);
            sLine := '';
            iDayOfWeek := 0;
        end;

//=====
// Question 4.2 - Alternative 1
// iDayOfWeek := cmbDays.ItemIndex + 1;
// for iCol := 1 to iDayOfWeek - 1 do
//     sLine := sLine + ' ' + #9;

```

```

// for iDate := 1 to iDaysInMonth do
//   begin
//     sLine := sLine + Copy(arrDates[iDate],1,2) + '('
//       + IntToStr(arrCustomers[iDate]) + ')' + #9;
//     inc(iDayOfWeek);
//     if iDayOfWeek = 8 then
//       begin
//         redQ4.Lines.Add(sLine);
//         sLine := '';
//         iDayOfWeek := 1;
//       end;
//     end;
//   redQ4.Lines.Add(sLine);

//=====
// Question 4.2 - Alternative 2
// iDayOfWeek := cmbDays.ItemIndex + 1;
// iDate := 1;
// iNumRows := Ceil((iDaysInMonth + iDayOfWeek) / 7);
// for iRow := 1 to iNumRows do
//   begin
//     sLine := '';
//     for iCol := 1 to 7 do
//       begin
//         if (iRow = 1) AND (iCol < iDayOfWeek) then
//           begin
//             sLine := sLine + ' ' + #9;
//           end
//         else
//           if iDate <= iDaysInMonth then
//             begin
//               sLine := sLine + IntToStr(iDate) + ' (' +
//                 IntToStr(arrCustomers[iDate]) + ')' + #9;
//               iDate := iDate + 1;
//             end;
//           end;
//         redQ4.Lines.Add(sLine);
//       end;
//     end;
end;

// -----
{$REGION 'PROVIDED CODE - DO NOT MODIFY!'}
procedure TfrmQ4.FormCreate(Sender: TObject);
begin
  redQ4.Paragraph.TabCount := 7;
  redQ4.Paragraph.Tab[1] := 50;
  redQ4.Paragraph.Tab[2] := 100;
  redQ4.Paragraph.Tab[3] := 150;
  redQ4.Paragraph.Tab[4] := 200;
  redQ4.Paragraph.Tab[5] := 250;
  redQ4.Paragraph.Tab[6] := 300;
  redQ4.Paragraph.Tab[7] := 350;
end;
{$ENDREGION}

end.

```