

INF1511

October/November 2017

VISUAL PROGRAMMING I

Duration 2 Hours

70 Marks

EXAMINERS

FIRST

SECOND

EXTERNAL

MS E LEUS

MRS A MATHEW

MR T CHIMBO

Closed book examination

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This examination question paper consists of 17 pages

The examination paper is divided into two sections, namely section A and section B.

Please answer only one section.

- Section A, which covers Python, is for students who registered for the subject in 2017
- Section B, which covers Delphi, is for students who were registered for the subject prior to 2017 and are writing a supplementary or special examination

Instructions

- Answer all the questions in the answer book
- Answers in pencil will **not be** marked
- The marks are provided in brackets next to the questions
- Enjoy!

Duration 2 hours

Marks 70

[Turn over]

Section A: Python**QUESTION 1****[20 marks]**

Question	Option	Answer
1 Which of the following statements describes the Tuple data type?	1	sequence of Unicode characters
	2	unordered collection of values
	3	ordered, immutable sequence of values
	4	unordered collection of key-value pairs
2 Which is the proper assignment for a string variable?	1	Word = "hello"
	2	Word = 'hello'
	3	Word = hello
	4	both 1 and 2
3 Which statement is true about keywords in Python?	1	Python has 50 keywords, which are reserved for special use
	2	Keywords contain lowercase letters only
	3	Keywords contain uppercase letters only
	4	Keywords can be used as regular identifiers
4 The function used to print messages and results of computations to the console is	1	print()
	2	printf()
	3	println()
	4	println()
5 Which operator will truncate the result of a division to an integer?	1	DIV
	2	//
	3	/
	4	#
	5	none of the above

[Turn over]

6 What is the output of the following statement? <code>print("Sarah",end= ' ')</code>	1	Sarah end
	2	end Sarah
	3	end = Sarah
	4	Sarah
7 The escape character that indicates a new line is	1	<code>\n</code>
	2	<code>\l</code>
	3	<code>\r</code>
	4	<code>\a</code>
8 The method will prompt the user to enter data and return it as a string.	1	<code>insert()</code>
	2	<code>string()</code>
	3	<code>int()</code>
	4	<code>input()</code>
9 What is the output of the following <code>lst = ['Tomato']</code> <code>print(len(lst))</code>	1	6
	2	1
	3	5
	4	none of the above
10 The value of x in <code>x = 5 in [3, 'yes', 'no', 5]</code> is	1	no
	2	4
	3	True
	4	none of the above
11 What will be the output of the following statement? <code>print(len("H1" + "there"))</code>	1	8
	2	H1there
	3	H1 there
	4	7
	5	none of the above

12 What is the output? <pre>name = "JaSoN" name = name lower() name = name swapcase() print(name)</pre>	1	JASON
	2	jAsOn
	3	jason
	4	none of the above
13 Which of the options will output the string I don't know?	1	<code>print('I don\'t know')</code>
	2	<code>print("I don\'t know")</code>
	3	<code>print("I don't know")</code>
	4	all of the above
14 What is the output of the following code? <pre>word = ["Bird"] word[0] = "Fish" print(word)</pre>	1	<code>['Bird']</code>
	2	<code>['BirdFish']</code>
	3	<code>['Fish']</code>
	4	none of the above
15 The output of <pre>print("#" join("Hey"))</pre> is	1	<code>#H#e#y#</code>
	2	<code>H#e#y</code>
	3	<code>#Hey</code>
	4	none of the above
16 A/an variable is shared by all instances of a class	1	object
	2	data
	3	instance
	4	class
17 What is it called when one class is derived from another single class?	1	simple inheritance
	2	single inheritance
	3	multi-level inheritance
	4	multiple inheritance
	5	none of the above

18 Which is a valid class definition in Python?	1	<pre>class MyClass "A simple class" a=10</pre>
	2	<pre>class MyClass(object) a=10</pre>
	3	both 1 and 2
	4	none of the above
19 is a special method that is automatically invoked right after a new instance of a class has been created	1	<code>str</code>
	2	<code>__init__</code>
	3	<code>print</code>
	4	none of the above
20 Which is not a built-in class attribute?	1	<code>def</code>
	2	<code>__doc__</code>
	3	<code>__name__</code>
	4	<code>__dict__</code>

QUESTION 2**[20 marks]**

- 2.1 Rewrite the following code to eliminate line 4 and modify lines 1 and 5 by replacing the sections of code with relevant constants and/or functions used in Python (3)

```
#circlearea.py
1 import math
2
3 r = float(input('Please enter the radius of a circle '))
4 pi = 22/7
5 area = r**2 * pi
6
7 print ('The area is. ',area)
```

- 2.2 An online store accepts online orders to a maximum quantity of 50 per product. Write a program that receives input from the user and that applies the `if else` statement. If the order quantity is less than 50, the program should display a message, "Order approved". If quantity exceeds 50, the program should display a message, "Order exceeds maximum quantity allowed" (4)

- 2.3 The following program displays numbers from 1 to 5 using the `while` loop. Rewrite the program to use the `break` statement to terminate an infinite `while` loop to print five numbers (4)

```
#whileloop.py

k=1
while k<=5
    print (k)
    k=k+1
```

Output

```
1
2
3
4
5
```

- 2.4 Write a program that accepts input from the user in the form of a string and identifies the case of the string as lower, upper or mixed case (4)
- 2.5 Write a program that asks the user to enter a numerical value between 1 and 3 and displays single, double and triple in text form. For example, if the user enters 1, the program will display "single". If the user enters 2, the program will display "double", and so on. Your program should have a user-defined function that receives the number from the calling program and returns the text form of it (5)

QUESTION 3**[30 marks]****3.1 Recursion**

- a) Define recursion and explain how you would prevent an infinite loop from occurring (2)
- b) Write a program that calculates the sum of numbers 5 to 11 using recursion (4)
- c) Write a program that calculates the factorial of 4 using recursion (4)

3.2 Classes

- a) A class consists of a number of attributes that include variables and methods
Fill in the blanks (2)
The variables are called _____, and the methods are called _____
- b) Consider the following statement and explain what the `pass` statement does and what its purpose is (2)

```
#passex.py
class rect(object):
    pass

rect.l=8
print(rect.l)
```

- c) What is the difference between a class variable and an instance variable? (2)

3.3 File handling

- a) The following program deletes line 2 from the `studentlist.txt` file. Provide the missing code (4)

```
import sys
f = open('studentlist.txt', 'r')
lines = f.readlines()
for line in lines:
    sys.stdout.write(line)
f.close()
```

- b) Provide the module and method name necessary to access a specific line from the `list.txt` file (2)

3.4 PyQt and widgets

- a) What is the purpose of the object inspector in Qt Designer? (1)
- b) What method ensures that a widget is displayed on a screen? (1)
- c) Give two examples of Input widgets (2)
- d) Which Phonon widget is used to display multimedia? (1)
- e) What method assigns text to the QLineEdit widget? (1)
- f) What widget would you use to select more than one option simultaneously from a group of options? (1)
- g) What does the `count()` function do when applied in a list widget? (1)

Section B: Delphi**QUESTION 1****[20 marks]**

Question	#	Options
1 What is the data type of the input of an <i>Edit</i> component?	1	caption
	2	string
	3	double
	4	cursor
	5	integer
2 The general format for assigning a value to the property of an object is	1	Object PropertyName = value,
	2	Object PropertyName = value,
	3	Object PropertyName(value),
	4	none of the above
3 Which is a valid variable name in Delphi?	1	employee1
	2	@suncity
	3	Begin
	4	none of the above
4 Which of the options is a valid declaration for a variable?	1	var myName = String,
	2	var sum int,
	3	var salary double ,
	4	none of the above
5 A component that can be used for text input is	1	SpinEdit
	2	button
	3	label
	4	memo
	5	none of the above
6 Which of the given statements is valid for declaring a constant?	1	Const myName='JohnBarrow',
	2	Const myName 'John Barrow',
	3	Const myName = 'John Barrow',
	4	var Const myName = 'John Barrow',

[Turn over]

7 Which of the statements is a correct declaration for the variable Num1 that can be used to store a real or floating-point number?	1	var Num1 Double,
	2	var Num1 Extended,
	3	var Num1 Single,
	4	var Num1 Currency,
	5	all of the above
8 Which of the given options is TRUE about the Case statement?	1	The Else part in a Case statement is optional
	2	All multiple alternative Ifs can be replaced with a Case statement
	3	Any Case statement can be replaced with a multiple alternative If structure
	4	All the above options are true
	5	Only 1 and 3 are true
9 Which is a valid Delphi statement, given that edtName is an <i>Edit</i> component	1	edtName Clear,
	2	edtName Clear(),
	3	Clear(edtName),
	4	none of the above
10 The procedure that should be strictly called before using the Random () function is	1	rand
	2	randomise
	3	reload
	4	regenerate
11 What is the output of the following code snippet sum = 6, Repeat sum := sum + 5, until sum > 5, ShowMessage('The value of sum is '+ IntToStr(sum))	1	will result in an infinite loop
	2	The value of sum is 6
	3	The value of sum is 11
	4	The value of sum is 16

12 The index of a dynamic array starts at	1	zero
	2	one
	3	-1
	4	a user-defined value
13 <code>N = FloatToStrF((1234 567, ffFixed, 15, 2),</code> What is the value of N?	1	12345.67
	2	1234567 00
	2	1234 56
	4	1234 57
	5	none of the above
14 Which of the given options can be a valid declaration in the <i>type</i> declaration section of a form for a user-defined procedure <code>Calculate</code> ?	1	<code>procedure Calculate(num1 integer, num2 integer, sum integer),</code>
	2	<code>procedure Calculate(num1 integer, num2 integer, var sum integer),</code>
	3	<code>procedure Calculate(num1, num2 integer) integer,</code>
	4	none of the above
15 What will happen if the start and end values of the loop control variable in a <code>for</code> loop are the same?	1	nothing
	2	an error message will be displayed
	3	loop will iterate once
	4	will result in an infinite loop
16 The string concatenation operator in Delphi is	1	+
	2	&
	3	and
	4	none of the above
17 Which among the given components is recommended for the input of a real (floating-point) value?	1	RadioGroup
	2	SpinEdit
	3	CheckBox
	4	Edit

18 var Salary array[1..10] of Integer, declares an array named Salary, of integer data type Which of the following assignment statements will assign an integer value to the first element in the array?	1	Salary[0] = 1000,
	2	Salary[1] = 1000,
	3	Salary[1..10] = 1000,
	4	Salary = 1000,
19 The statement var ItemsArray array[1..50] of String, declares	1	an array that stores a single string of a maximum of 50 characters
	2	an array that can store 50 strings
	3	a string variable that can store a maximum of 50 characters
	4	none of the above
20 Which is a TRUE statement?	1	A variable declaration is optional in Delphi
	2	Delphi has both visual and non-visual components
	3	All the elements stored in an array should be of the same data type
	4	All of the above statements are true
	5	Only 2 and 3 are true

QUESTION 2**[18 marks]**

2.1 What is the difference between = and := in Delphi? Illustrate with an example (2)

2.2 Name two components in Delphi whose input data type is string (2)

2.3 Name two container components in Delphi (2)

2.4 Identify the error(s) in the following loop construct. The purpose of the loop is to find the sum of the first ten natural numbers. Assume variable declarations and initialisations (2)

```
for i := 1 to 10 do
begin
    sum = sum + i,
    i = i + 1,
end,
```

2.5 Mention one difference between a while loop and a for loop (2)

[Turn over]

2.6 Compare procedures and functions (Give either one similarity or one difference) (2)

2.7 What is the difference between the local variables and the parameters of a subroutine? (2)

2.8 Write the statement that declares a two-dimensional array named `matrix` with five rows and four columns to hold integer values (2)

2.9 Write the statement that declares a constant integer array named `Even` and initialises it to the values 2, 4, 6, 8, 10 (2)

QUESTION 3

[32 marks]

3.1 The following code fragment is used to display the value in the integer variable `x` as the caption of a label named `lblShow`. Correct the code and write it on your answer sheet (1)

```
var x : integer;
begin
  x = 100,
  lblShow.Caption = x,
end,
```

3.2 Fill in the missing header of the definition for the subroutine `calcProfit` in the following code fragment (2)

[Note: Where it says 'Assume code', you do not have to fill them in. The code snippets needed to identify the type of subroutine, its parameters and its return value are given to you. Based on that, write the header for the subroutine only as your answer.]

```
procedure TFormProfit btnCalcClick(Sender: TObject),
var sellingprice, costprice, profit: double
begin
  //Assume code that assigns values to selling_price, cost_price and profit
  .

  //call to the subroutine
  calcProfit(sellingprice, costprice, profit),

  //display profit in an edit box
  edtProfit.Text := FloatToStrF(profit, ffCurrency, 15, 2)

end,

//definition of the subroutine
... .. //fill in the header here .
begin
  calcProfit = sp - cp,
end,
```

[Turn over]

- 3.3 Correct the following `if` statement for a logic error. The purpose of the `if` statement is to determine the bursary amount based on the mark percentages as shown in the table below. (4)

Mark percentage	Bursary amount
< 60%	R0 00
60% to 74%	R3 000 00
75% to 89%	R5 000 00
90% and above	R8 000 00

Assume variable declarations and correct the following `if` statement.

```
if MarkPerc < 60 then
    Amount = 0 00,
else if MarkPerc > 60 then
    Amount = 3000 00,
else if MarkPerc >= 75 then
    Amount = 3000 00,
else
    Amount = 8000 00,
```

- 3.4 Use the table in question 2 and construct a `Case` statement to calculate the bursary amount. Write the `Case` statement only, assuming the variable declarations for `MarkPerc` and `Amount`. (5)
- 3.5 Consider the following declaration for an array in a procedure on a form. Assume the form and controls are in place. Write a `for` loop that reads the elements from the array one by one and adds it to a list box named `lstDays`. Declare any variable(s) required for the `for` loop. (4)
- [Note: Write the variable declaration(s) and the `for` loop only.]

```
var DaysOfWeek array[0..4] of String =
('Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday'),
```

- 3.6 The assistant in the R99.99 CD Shop (the standard price for all CDs is R99.99) uses a `SpinEdit` component to indicate how many CDs a customer buys. Depending on the type of customer, a certain percentage is deducted as a discount. Write the subroutine needed for this program. Assume the declaration for the subroutine is in place in the `type` declaration section of the form. (8)

The interface for the R99.99 CD Shop and the table showing the discount percentages are shown below.

Customer type	Discount
Student	5%
Scholar	10%
Pensioner	20%
Others	No discount

The interface uses the event handlers below

```

procedure TfrmCDs.radStudentClick(Sender TObject),
begin
  lblAmountDue.Caption = AmountDue (0.05, sedNumberOfCDs.Value),
end,
procedure TfrmCDs.radPensionerClick(Sender TObject),
begin
  lblAmountDue.Caption = AmountDue (0.20, sedNumberOfCDs.Value);
end,
procedure TfrmCDs.radScholarClick(Sender TObject),
begin
  lblAmountDue.Caption = AmountDue (0.10, sedNumberOfCDs.Value),
end,
procedure TfrmCDs.radOtherClick(Sender TObject),
begin
  lblAmountDue.Caption = AmountDue (0, sedNumberOfCDs.Value),
end,

```

- 3 7 You are asked to design a form in Delphi in which a user can input a string. At the user's command, the string should be displayed in reverse on the form (8)
- 3 7 1 What will be your choice of components to design a user-friendly form? Indicate the purpose of each component of your choice (3)
- 3 7 2 Based on your choice of components in 3 7 1, name each component (1)
- 3 7 3 Based on your choice of components, indicate the event-handler that you will use to accomplish the task (1)
- 3 7 4 Write the code that you will use in the event-handler, making use of the components that you have chosen in 3 7 1 (3)

Appendix

Components/ library functions or procedures	Properties	Methods	Hint
ListBox	Items		Represent a list of strings displayed in a ListBox
ListBox		Add	Add a string to the end of the list of strings in a ListBox This method requires the string to be added to the list as a parameter
SpinEdit	Value		
Edit		Clear	Set the value of the Text property to an empty string It does not require any input data
Edit	Text		
InputBox function			InputVal = InputBox(WindowCaption, Prompt, DefaultVal),
ShowMessage procedure			ShowMessage(StringToDisplay),
FloatToStrF			FloatToStrF(Value,Format,Precision, Digits), Format could be any of these ffFixed, ffGeneral,ffExponent, ffNumber or ffCurrency
FloatToStr			FloatToStr(N)), where N is a Real-type value
StrToFloat			StrToFloat(string),
DateToStr			DateToStr(Date),
Trim			Trim(string),
Length			Length(string),
IntToStr			IntToStr(N), where N is an integer value
StrToInt			StrToInt(string)
UpperCase			UpperCase(string)