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**COMPUTER SCIENCE**

**9608/23**

Paper 2

**May/June 2017**

MARK SCHEME

Maximum Mark: 75

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**Published**

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This document consists of **13** printed pages.

Question	Answer	Marks								
1(a)	<p><b>Input:</b></p> <ul style="list-style-type: none"> <li>• Enter data into the system // get / receive / read data</li> <li>• INPUT MyVar // READFILE MyFile, MyString</li> </ul> <p><b>Process:</b></p> <ul style="list-style-type: none"> <li>• Manipulate / change data in some way // perform a calculation / find a result</li> <li>• MyChar ← 'X' // MyNum ← MyNum + 1</li> </ul> <p><b>Output:</b></p> <ul style="list-style-type: none"> <li>• Send data out from the system // display / print / transmit / show data</li> <li>• OUTPUT "Hello World" // WRITEFILE MyFile, MyString</li> </ul> <p>Mark as follows: 1 mark for each type (in bold) 1 mark for each description and pseudocode example</p>	7								
1(b)(i)	Boolean	1								
1(b)(ii)	Logical / Boolean	1								
1(b)(iii)	<table border="1"> <thead> <tr> <th>Expression</th> <th>Evaluates to</th> </tr> </thead> <tbody> <tr> <td>FlagA AND (FlagB OR FlagC)</td> <td><b>TRUE</b></td> </tr> <tr> <td>FlagA AND (FlagB AND FlagC)</td> <td><b>FALSE</b></td> </tr> <tr> <td>(NOT FlagA) OR (NOT FlagC)</td> <td><b>FALSE</b></td> </tr> </tbody> </table> <p>1 mark per answer</p>	Expression	Evaluates to	FlagA AND (FlagB OR FlagC)	<b>TRUE</b>	FlagA AND (FlagB AND FlagC)	<b>FALSE</b>	(NOT FlagA) OR (NOT FlagC)	<b>FALSE</b>	3
Expression	Evaluates to									
FlagA AND (FlagB OR FlagC)	<b>TRUE</b>									
FlagA AND (FlagB AND FlagC)	<b>FALSE</b>									
(NOT FlagA) OR (NOT FlagC)	<b>FALSE</b>									
1(c)	<pre>MyCount ← 100 WHILE MyCount &lt; 201     Output MyCount     MyCount ← MyCount + 2 ENDWHILE</pre> <p>1 mark for each of the following:</p> <ul style="list-style-type: none"> <li>• Counter initialisation</li> <li>• While ... End loop</li> <li>• Method for choosing (correct range of) even numbers</li> <li>• Output all even numbers in the range</li> </ul> <p>Note: Counter variable name must be consistent</p>	4								

Question	Answer	Marks
2(a)	Stepwise refinement	1
2(b)	1 mark for first 2 data types – String  1 mark for last 2 data types – Boolean  1 mark for each description: PasswordInput      Stores password <u>entered</u> UserIDFound        True if user ID found in the <u>file</u> PasswordValid      True if password entered matches password from <u>file</u> //Input password matches stored password	5
2(c)	<ol style="list-style-type: none"> <li>1. LOOP through the file until EOF...</li> <li>2. ...OR UserIDInput is found</li> <li>3. READ text line from Password.txt file in a loop</li> <li>4. SPLIT into UserID and password in a loop</li> <li>5. IF UserIDInput matches UserID from file THEN in a loop</li> <li>6. SET UserIDFound to TRUE in a loop</li> <li>7. IF UserIDFound = TRUE AND PasswordInput matches value from file THEN</li> <li>8. Set PasswordValid to TRUE</li> </ol> <p>Mark as follows:</p> <p>1 mark per functional equivalent of each numbered statement.</p>	8

Question	Answer	Marks
3	<pre> FUNCTION StringClean(<u>Instring</u> <u>STRING</u>) RETURNS <u>STRING</u>   DECLARE NextChar : <u>CHAR</u>   DECLARE <u>OutString</u> : STRING   <u>OutString</u> ← "" // initialise the return string    // loop through Instring to produce OutString   FOR n ← 1 TO <u>LENGTH(InString)</u> // from first to last     NextChar ← <u>MID(Instring, n, 1)</u> //get next                                      character and     NextChar ← <u>LCASE(NextChar)</u> //convert to lower                                      case     IF <u>NextChar &gt;= 'a' AND NextChar &lt;= 'z'</u> //check if                                      alphabetic       THEN         <u>OutString ← OutString &amp; NextChar</u> //add to                                      OutString       ENDIF     ENDFOR    <u>RETURN OutString</u> // return value ENDFUNCTION </pre> <p>One mark per <u>underlined</u> word / expression</p>	11

Question	Answer	Marks
4(a)	<ul style="list-style-type: none"> <li>• The <u>hierarchy</u> of modules</li> <li>• <u>Parameters</u> that are passed between modules // The <u>interface</u> between the modules /</li> <li>• The <u>sequence</u></li> <li>• Iteration / selection</li> </ul> <p>One mark per item</p>	3
4(b)	<pre> <u>FUNCTION</u> <u>CardPayment</u> (<u>ParamA</u> : REAL, <u>ParamB</u> : STRING) <u>RETURNS</u> <u>BOOLEAN</u> </pre> <p>One mark per underlined part Order not significant for ParamA and ParamB</p> <p>Function name and parameter names not important but must be present</p>	3

Question	Answer	Marks
5	<p>Pseudocode solution included here for development and clarification of mark scheme. Programming language <b>example</b> solutions appear in the <b>Appendix</b>.</p> <pre> PROCEDURE SearchFile()  DECLARE FileData : STRING DECLARE MyArrayRow : INTEGER DECLARE SearchID : STRING MyArrayRow ← 0 / 1 OPEN "Loginfile.txt" FOR READ INPUT SearchID  WHILE NOT EOF("Loginfile.txt")   READFILE "Loginfile.txt", Filedata   IF SearchID = LEFT(FileData,5)     THEN       LoginEvents[MyArrayRow,1] ← MID(Filedata, 6, 4)       LoginEvents[MyArrayRow,2] ← RIGHT(Filedata, 14)       MyArrayRow ← MyArrayRow + 1     ENDF   ENDWHILE  CLOSEFILE("LoginFile.txt")  ENDPROCEDURE </pre> <p>1 mark for each of the following:</p> <ol style="list-style-type: none"> <li>1. Procedure heading and ending</li> <li>2. Declare MyArrayRow as integer // commented in python</li> <li>3. Initialising MyArrayRow</li> <li>4. Input SearchID</li> <li>5. Open file "LoginFile.txt" for input / read</li> <li>6. Correct loop incorporating EOF()</li> <li>7. Read a line from the file <b>in a loop</b></li> <li>8. Compare SearchID with correct data from file <b>in a loop</b></li> <li>9. Assign both values to LoginEvents[MyArray] <b>in a loop</b></li> <li>10. Increment MyArrayRow correctly <b>in a loop</b></li> <li>11. Close the file <b>not in a loop</b></li> </ol>	10

Question	Answer	Marks
6(a)	<p>Pseudocode solution included here for development and clarification of mark scheme. Programming language solutions appear in the Appendix.</p> <pre> FUNCTION ValidatePassword(InString : STRING) RETURNS BOOLEAN DECLARE LCaseChar, UCaseChar, NumChar, n : INTEGER DECLARE NextChar : CHAR DECLARE ReturnFlag : BOOLEAN ReturnFlag ← TRUE LCaseChar ← 0, UCaseChar ← 0, NumChar ← 0  FOR n ← 1 TO LENGTH(InString)   NextChar ← MID(InString,n,1)   IF NextChar &gt;= 'a' AND NextChar &lt;= 'z'     THEN       LCaseChar ← LCaseChar + 1     ELSE       IF NextChar &gt;= 'A' AND NextChar &lt;= 'Z'         THEN           UCaseChar ← UCaseChar + 1         ELSE           IF NextChar &gt;= '0' AND NextChar &lt;= '9'             THEN               NumChar ← NumChar + 1             ELSE               ReturnFlag ← False //invalid                                 character           ENDIF         ENDIF       ENDIF     ENDIF   ENDFOR  IF Not (LCaseChar&gt;=2 AND UCaseChar&gt;= 2 AND NumChar&gt;= 3)   THEN     ReturnFlag ← FALSE   ENDIF RETURN (ReturnFlag) ENDFUNCTION </pre> <p>1 mark for each of the following:</p> <ol style="list-style-type: none"> <li>1. Correct Function heading and ending</li> <li>2. Declaring three counter variables (upper, lower, numeric)</li> <li>3. Initialising counters</li> <li>4. Correct loop</li> <li>5. Picking up NextChar from InString</li> <li>6. Check and count number of lower case</li> <li>7. Check and count number of upper case</li> </ol>	10

Question	Answer	Marks
6(a)	8. Check and count number of numeric 9. Check for invalid character 10. Combine all four tests into a single Boolean value 11. Returning correct Boolean value	
6(b)(i)	<p><b>String1: (e.g. "AAAbb123")</b></p> <p>One mark for a valid string having:</p> <ul style="list-style-type: none"> <li>• at least 2 uppercase alphabetic</li> <li>• at least 2 lowercase alphabetic</li> <li>• at least 3 numeric characters</li> <li>• No other character</li> </ul> <p><b>String2 – String5:</b></p> <p>One mark for correct string <b>and</b> explanation (testing different rules of the function)</p> <p>Test strings breaking <b>different</b> rules:</p> <ul style="list-style-type: none"> <li>• With incorrect numbers of:               <ul style="list-style-type: none"> <li>• Lower case characters</li> <li>• Upper case characters</li> <li>• Numeric characters</li> </ul> </li> <li>• Containing an invalid character</li> </ul>	<b>5</b>
6(b)(ii)	White Box	<b>1</b>
6(b)(iii)	<ul style="list-style-type: none"> <li>• Testing may be carried out before the modules are developed // not ready for full testing</li> <li>• Module stubs contain simple code to provide a known response // temporary replacement for a called module</li> </ul>	<b>2</b>

**Programming Solutions****Programming Code Example Solutions****Q5 : Visual Basic**

```
Sub SearchFile()  
    Dim FileData As String  
    Dim SearchID As String  
    Dim ArrayIndex As Integer  
  
    ArrayIndex = 1  
    FileOpen(1, "LoginFile.txt", OpenMode.Input)  
    SearchID = Console.ReadLine()  
  
    Do While Not EOF(1)  
        FileData = LineInput(1)  
        If SearchID = LEFT(FileData, 5) Then  
            LoginEvents(ArrayIndex, 1) = Mid(Filedata, 6, 4)  
            LoginEvents(ArrayIndex, 2) = Right(Filedata, 14)  
            ArrayIndex = ArrayIndex + 1  
        End If  
    Loop  
    FileClose(1)  
End Sub
```

**Alternative:**

```
Sub SearchFile()  
    Dim FileData As String  
    Dim SearchID As String  
    Dim ArrayIndex As Integer  
    Dim MyFile As System.IO.StreamReader  
  
    ArrayIndex = 1  
    MyFile = Mycomputer.FileSystem.OpenTextFileReader("Loginfile.txt")  
    SearchID = Console.ReadLine()  
  
    Do While MyFile.Peek < > -1  
        FileData = MyFile.ReadLine()  
        If SearchID = LEFT(FileData, 5) Then  
            LoginEvents(ArrayIndex, 1) = Mid(Filedata, 6, 4)  
            LoginEvents(ArrayIndex, 2) = Right(Filedata, 14)  
            ArrayIndex = ArrayIndex + 1  
        End If  
    Loop  
    MyFile.Close  
End Sub
```



**Q5 : Pascal**

```
Procedure SearchFile();

var FileData      : String;
var SearchID      : String;
var ArrayRow      : Integer;
Var MyFile        : Text;

Begin
  ArrayRow := 1;
  Assign(MyFile, "Loginfile.txt");
  Reset(MyFile);
  Readln(SearchID);

  While NOT EOF(MyFile) do
  Begin
    Readln(MyFile, FileData)
    IF SearchID = LeftStr(FileData,5) then
      Begin
        LoginEvents[ArrayRow,1] = Copy(FileData,6,4);
        LoginEvents[ArrayRow,2] = Rightstr(FileData,14);
        ArrayRow = ArrayRow + 1
      End;
    End;

  Close(MyFile);
End.
```

**Q5 : Python**

```
def SearchFile():

    # FileData : STRING
    # ArrayRow : INTEGER
    # SearchID : STRING

    ArrayRow = 0
    MyFile = open("Loginfile.txt", 'r')
    SearchID = input()
    FileData = MyFile.readline()

    While FileData != ""
        If SearchID == FileData[:5] #First 5 characters
            LoginEvents[ArrayRow][1] = FileData[5:9] #next 4 characters
            LoginEvents[ArrayRow][2] = FileData[-14:] #last 14 characters
            ArrayRow = ArrayRow + 1
            FileData = MyFile.readline()

    myFile.close()
    return()
```

**Alternative:**

```
def SearchFile():

    # FileData : STRING
    # ArrayRow : INTEGER
    # SearchID : STRING

    ArrayRow = 0
    Myfile = open("Loginfile.txt", 'r')
    SearchID = input()
    For FileData in MyFile
        IF SearchID == FileData[:5] #First 5 characters
            LoginEvents[ArrayRow][1] = FileData[5:9] #next 4 characters
            LoginEvents[ArrayRow][2] = FileData[-14:] #last 14 characters
            ArrayRow = ArrayRow + 1

    MyFile.close()
    return()
```

**Q6 (a): Visual Basic**

```
Function ValidatePassword(InString As String) As Boolean
    Dim LCaseChar, UCaseChar, NumChar As Integer
    Dim NextChar As Char
    Dim ReturnFlag As Boolean
    Dim n As Integer
    ReturnFlag = TRUE
    LCaseChar = 0
    UCaseChar = 0
    NumChar = 0

    For n = 1 to Len(InString)
        NextChar = Mid(InString, n, 1)
        If NextChar >= 'a' And NextChar <= 'z' Then
            LCaseChar = LCaseChar + 1
        Else
            If NextChar >= 'A' And NextChar <= 'Z' Then
                UCaseChar = UCaseChar + 1
            Else
                If NextChar >= '0' And NextChar <= '9' Then
                    NumChar = NumChar + 1
                Else
                    ReturnFlag = False //invalid character
                End If
            End If
        End If
    Next

    If NOT (LCaseChar >= 2 And UCaseChar >= 2 And NumChar >= 3) Then
        ReturnFlag = FALSE
    End If

    Return(ReturnFlag)

End Function
```

**Q6 (a): Pascal**

```
Function ValidatePassword(InString : String): Boolean;
  Var LCaseChar, UCaseChar, NumChar : Integer;
  Var NextChar : Char;
  Var ReturnFlag : Boolean;
  Var n : Integer;

  begin
    ReturnFlag := TRUE;
    LCaseChar := 0;
    UCaseChar := 0;
    NumChar := 0;

    For n := 1 to Length(InString) do
      begin
        NextChar := Copy(InString,n,1);
        If NextChar >= 'a' And NextChar <= 'z' Then
          LCaseChar := LCaseChar + 1
        Else If NextChar >= 'A' AND NextChar <= 'Z' Then
          UCaseChar := UCaseChar + 1
        Else If NextChar >= '0' AND NextChar <= '9' Then
          NumChar := NumChar + 1
        Else
          ReturnFlag := False //invalid character
      end
    end

    If NOT(LCaseChar >= 2 And UCaseChar >= 2 And NumChar >=3) then
      ReturnFlag := False;

    ValidatePassword := ReturnFlag
  end;
```

**Q6 (a): Python**

```
def ValidatePassword(InString):
    # lCaseChar, uCaseChar, numChar : INTEGER
    # nextChar : CHAR
    # returnFlag : BOOLEAN
    # n : INTEGER
    returnFlag = TRUE
    lCaseChar = 0
    uCaseChar = 0
    numChar = 0

    for n in range (0, Len(InString))
        nextChar = InString[n]
        If nextChar >= 'a' and nextChar <= 'z':
            lCaseChar = lCaseChar + 1
        ELSE:
            IF nextChar >= 'A' and nextChar <= 'Z':
                uCaseChar = uCaseChar + 1
            ELSE:
                IF nextChar >= '0' and nextChar <= '9':
                    numChar = numChar + 1
                ELSE:
                    returnFlag = False    //invalid character

    IF Not (lCaseChar >= 2 and uCaseChar >= 2 and numChar >= 3):
        returnFlag = FALSE

    Return (returnFlag)

#next code block
```