CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the May/June 2015 series

9691 COMPUTING

9691/21 Paper 2 (Written Paper), maximum raw mark 75

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International Examinations

1 (a) (i) 66 **[1]**

(ii) error **[1]**

(iii) 'C' (accept without quotes) **[1]**

(b)
```
Letter15 ← CHAR(ASCII('A') + 14)
```
[2]

Completely correct – 2 marks
Single error of (not 14) scores 1 mark

(c) (i)
- letter A-Z have increasing ASCII codes
- the ASCII values of the two characters are compared
- the character with the smaller value is the first character / the character with the larger value is the second character **[2]**

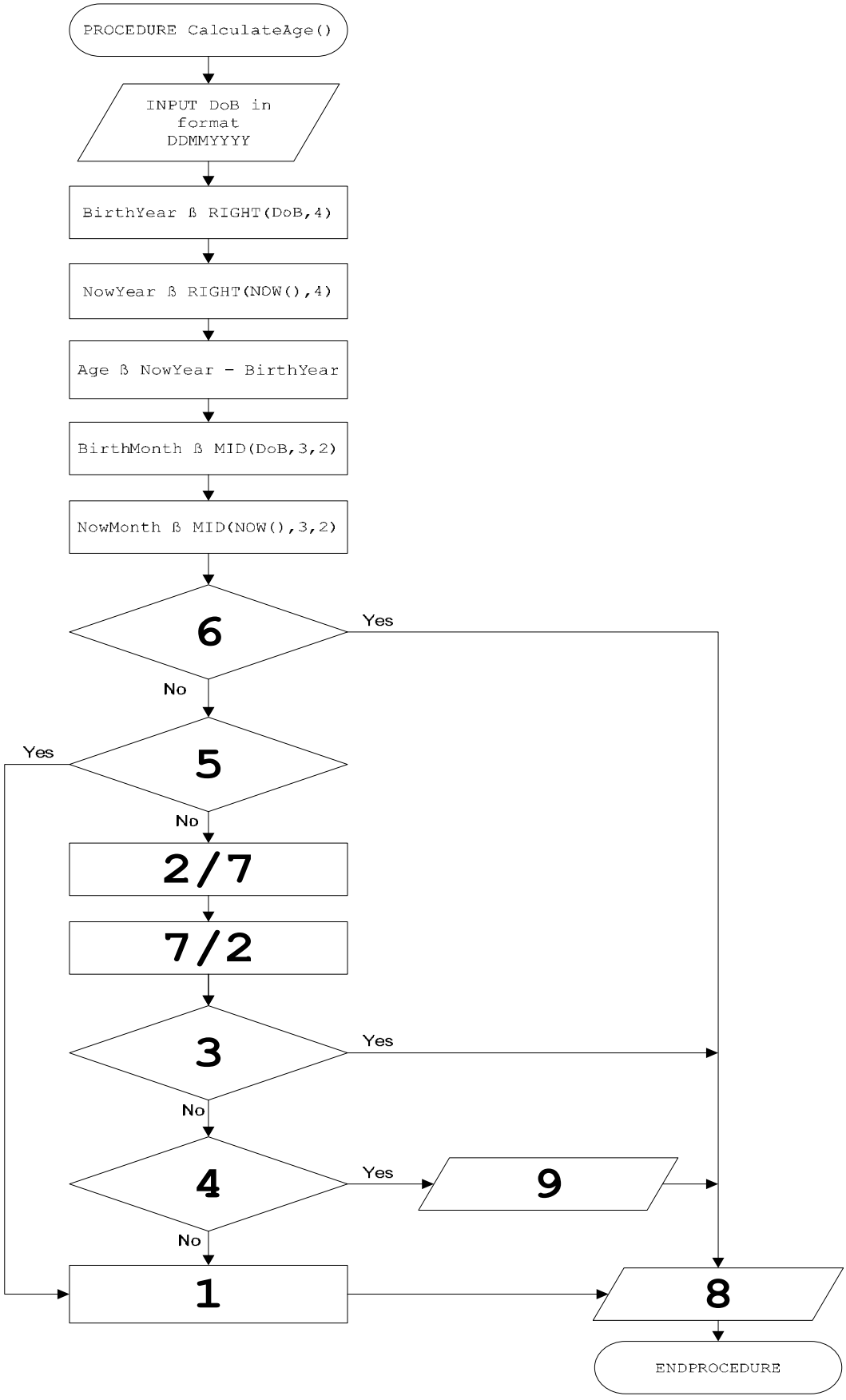
(ii)
- ASCII codes of the characters are compared in turn …
- from left hand side / start of each word
- … until two characters are different
- the lower code value determines the first word
- if 2 words are the same when one ends …
- … this is the first word **[4]**

(iii) Mark as follows:
- Function header (ignore data type) & termination
- Data types for parameter and return value
- Change letter to ASCII
- Add 32
- Change ASCII code to letter
- Return value

Example pseudocode
```
FUNCTION LowerCase(Letter : CHARACTER) RETURNS CHARACTER
   DECLARE LetterCode : INTEGER
   LetterCode ← ASCII(Letter) + 32
   Letter ← CHAR(LetterCode)
   RETURN Letter
ENDFUNCTION
```
[6]

2 (i) "01072015" **[1]**

(ii)



1 mark for each box except 2/7 are 1 mark for both. **[8]**

(iii) Five dates to cover the following cases:
- Birth month before current month
- Birth month after current month
- Birth month equal to current month + birth day before current day
- Birth month equal to current month + birth day after current day
- Birth month equal to current month + birth day equal to current day **[5]**

3 (a) (i) *Mark as follows:*
- *correct index range*
- *correct data type*

Example Pascal:

```
VAR Letters : ARRAY[0..25] OF INTEGER;
```
[2]

(ii) 0
Do not accept "0" **[1]**

(iii) *Mark as follows:*
- *correct loop from 0 to 25 (accept REPEAT or WHILE loops that work)*
- *assignment of initial value to array element (allow ft from part **(ii)**)*

Example Pascal

```
FOR i := 0 TO 25 DO
   Letters[i] := 0;
```
[2]

(b) (i)
```
WHILE NOT EOF(MessageText)
 ::
// calculate index using ASCII function from Question 1
   Index ← ASCII(NextLetter) - ASCII('A')
  // increment relevant frequency total in Letters array
   Letters[Index] ← Letters[Index] + 1
```
[3]

(ii)
- returns a Boolean value
- checks whether it reached a marker written to the file …
- immediately after the last character **[max 2]**

(No marks for "End Of File")

(c) (i) *Mark as follows:*

- *parameter*
- *returns data type*
- *declaration of local variable(s)*
- *Initialisation(s)*
- *loop*
- *Boolean statement*
- *updating of largest so far*
- *store index of where largest so far was found*
- *return index of most frequent letter*

Example answer:

```
FUNCTION MostFrequentLetterIndex(Letters : ARRAY OF INTEGER)
                                           RETURNS INTEGER
   DECLARE Index : INTEGER
   DECLARE LargestSoFar : INTEGER
   DECLARE i : INTEGER
   LargestSoFar ← 0
   Index ← -1    // reject a value within 0 to 25
   FOR i ← 0 TO 25
      IF Letters[i] > LargestSoFar
         THEN
           LargestSoFar ← Letters[i]
           Index ← i
      ENDIF
   ENDFOR
   RETURN Index
ENDFUNCTION
```

[max 8]

(ii)
```
MostFrequentLetter ← CHAR(MostFrequentLetterIndex() + 65)
```
[1]

(iii)
```
Displacement ← ASCII(MostFrequentLetter) – ASCII('E')
```
[1]

(d) (i)

x	y	z	w	OUTPUT
"E"	69	72	"H"	"H"
"B"	66	69	"E"	"E"
"I"	73	76	"L"	"L"
"M"	77	80	"P"	"P"

1 mark per column (first three) – 1 mark last two columns **[4]**

(ii) Converts an encrypted message into plain text **[1]**

(iii) Any **one** from:
- Annotation / comments
- Keywords in capitals **[1]**

(iv) Meaningful variable names
Indentation **[2]**

(e) (i) Any example of a syntax error such as:
mis-spelling of keyword
mismatched brackets **[1]**

(ii) syntax error
When: during compilation // during code entry into Integrated Development Environment
How: translator diagnostics / compiler error messages // IDE highlights error **[2]**

(iii) (The logic of) the method of solution was not correct
Or by example **[1]**

(iv) logic error
When: during testing / execution
How: when expected results don't match actual results **[2]**

(f) (i)
```
03 FOR i ← 0 TO 25
04   Used[i] ← FALSE
```
[2]

(ii)
```
06 FUNCTION RandomCode () RETURNS INTEGER
07     REPEAT
08         Code ← Random(25)
09     UNTIL Used[Code] = FALSE
10     Used[Code] ← TRUE
11     RETURN Code
12 ENDFUNCTION
```
[4]

(iii)
```
13 // main program
14 // calculate and store unique random letters
15 // in second column of array LetterGrid
16 FOR i ← 0 TO 25
17     LetterGrid[i,2] ← CHAR(65 + RandomCode())
18 ENDFOR
```
[2]

(iv)
- check contents of `LetterGrid` array
- every letter is there exactly once in second column **[2]**