CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the October/November 2014 series

9691 COMPUTING

9691/22   Paper 2 (Written Paper), maximum raw mark 75

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1 (a) (i) *Mark as follows:*
1 mark for suitable labels/explanations for fields
1 mark for name and age entry options
1 mark for radio buttons or similar for Boolean club member field
1 mark for event choice (e.g. drop down list or radio buttons)
1 mark for fee box
1 mark for Confirm button [6]

(ii) Up to two marks for justification of features used in (i) [2]

(b) (i)

Field Name	Data Type	Field Size (bytes)
CompetitorName	String	26 (approx.) 15–40
CompetitorAge	Integer /Byte /ShortInt	4 1 2
ClubMember	Boolean	1
EventEntered	Char/Character	1/2
EntryFee	Currency/Real/float/single /decimal	4/8 /16

1 mark for each cell correct (Do not give a mark for a range) [10]

(ii) *1 mark for adding all 5 field lengths together (e.g. 40 bytes)*
1 mark for multiplying by 100 (e.g. 4000 bytes)
1 mark for adding 10% overheads (e.g. 4400 bytes) [3]

2 (a)

Loop	1	2	3	4	5	6	7	8
	s	z	x	y	m	List[m]	List[m] = s	List[m] > s
	64	–	1	15	–	–	–	–
		FALSE			–	–	–	–
1			9		8	52	**FALSE**	**FALSE**
2				11	12	79	**(FALSE)**	**TRUE**
3				9	10	67	**(FALSE)**	**(TRUE)**
4		**TRUE**			9	64	**TRUE**	

OUTPUT 9   [8]

1 mark for each column 2 to 8 correct (if no marks mark row by row)
1 mark for OUTPUT correct

(b) – searches for s (64) // (binary) search
– outputs position/index of requested value in list   [2]

3 (a) (i) 1 mark for suitable values for white and black tokens
1 mark for suitable value for empty cell (e.g. NULL, "", 0, –1)   [2]

   (ii) e.g. Pascal

```
VAR Grid : Array[1..6, 1..7] OF CHAR;      // 3 marks
FOR Row := 1 TO 6 DO                       // 1 mark
   FOR Column := 1 TO 7 DO                 // 1 mark
      Grid[Row, Column] := NULL;           // 2 marks
```

Mark as follows:
1 mark for correct identifier
1 mark for correct dimensions (6×7 or 7×6 elements)
1 mark for data type (needs to match the assignment)
1 mark for outer loop
1 mark for inner loop
1 mark for correct indexes
1 mark for correct assignment of a value to represent an empty cell

No marks for pseudocode   [7]

   (iii) `Grid[2, 4] := 'X';`   // 2 marks   [2]

   (b) e.g. Pascal

```
FOR Row := 6 DOWNTO 1 DO
   BEGIN
      FOR Column := 1 TO 7 DO
         Write(Grid[Row, Column]);
      Writeln;
   END;
```

1 mark for correctly counting down
1 mark for correctly nested loops
1 mark for correct output statement with correct array element indexes
1 mark for correct new line (i.e. new line in outer loop only)
1 mark for appropriate indentation and suggested variable names (row, column, grid) [max 4]

(c) (i)
```
FUNCTION ColumnNumberValid(x : INTEGER) RETURNS BOOLEAN
    DECLARE Valid : BOOLEAN
    IF (x < 1) OR (x > 7)  // x outside range?
       THEN
          Valid ← FALSE          // column number not within range
       ELSE
          IF Grid[6, x] = NULL   // cell in top row empty?
             THEN
                Valid ← TRUE      // cell empty
             ELSE
                Valid ← FALSE     // cell not empty
          ENDIF
    ENDIF
    RETURN Valid
ENDFUNCTION
```

1 mark for each gap correctly filled   [8]

(c) (ii)

Type of test data	Example test data	Justification
Normal/valid	Any integer between 1 and 7	A column number with top row free
Boundary/Borderline	Any integer between 1 and 7	A column number with column full/nearly full Accept boundary values for column number, e.g. 1/7 (first or last column)
Erroneous/Invalid	Any integer out of range (<1 or >7)	out of range

1 mark per cell correctly entered   [9]

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(d)
```
01 REPEAT
02     INPUT ChosenColumnNumber
03 UNTIL ColumnNumberValid(ChosenColumnNumber)
04 Row ← 1  // start with bottom row and find first empty row
05 WHILE Grid[Row, ChosenColumnNumber] <> NULL
06     Row ← Row + 1
07 ENDWHILE
08 IF NextPlayer = 'A'
09     THEN
10         Grid[Row, ChosenColumnNumber] ← 'O' // 'X'
11     ELSE
12         Grid[Row, ChosenColumnNumber] ← 'X' // 'O'
13 ENDIF
```

1 mark each for completing lines 3, 5, 6, 8.
1 mark for completing lines 10 and 12 correctly   [5]

(e) (i) Player: passed by value   1 mark
Number: passed by reference   1 mark   [2]

(ii) `GetColumn(NextPlayer, ChosenColumnNumber)`

1 mark for each correct parameter   [2]

(f) – indentation
– meaningful identifiers
– Initialising variables
– annotation/comments
– parameters
– procedure calls/modular structure
– keywords in capital letters   [max 3]