higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PRINCIPLES OF COMPUTER PROGRAMMING

(First paper)

NQF LEVEL 3

3 March 2020

This marking guideline consists of 6 pages.

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SECTION A

QUESTION 1

1.1 D
1.2 A
1.3 C
1.4 B: Double precision refers to the size of the variable in memory usually requiring 64 bits
1.5 C
1.6 B
1.7 B
1.8 C
1.9 C
1.10 A

(10 × 1) **[10]**

QUESTION 2

2.1 False
2.2 True
2.3 True
2.4 False
2.5 False
2.6 False
2.7 False
2.8 True
2.9 False
2.10 False

(10 × 1) **[10]**

QUESTION 3

3.1 Overflow
3.2 Constant
3.3 Select
3.4 Two's complement
3.5 Iteration/repetition

(5 × 1) **[5]**

TOTAL SECTION A: 25

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SECTION B

QUESTION 4

4.1 F = Q AND (R OR NOT S)

Q	R	S	NOT S	R OR NOT S	F
0	0	0	1	1	0
0	0	1	0	0	0
0	1	0	1	1	0
0	1	1	0	1	0
1	0	0	1	1	1
1	0	1	0	0	0
1	1	0	1	1	1
1	1	1	0	1	1
			✓ Column correct	✓✓ Column correct	✓✓ Column correct

(5)

4.2

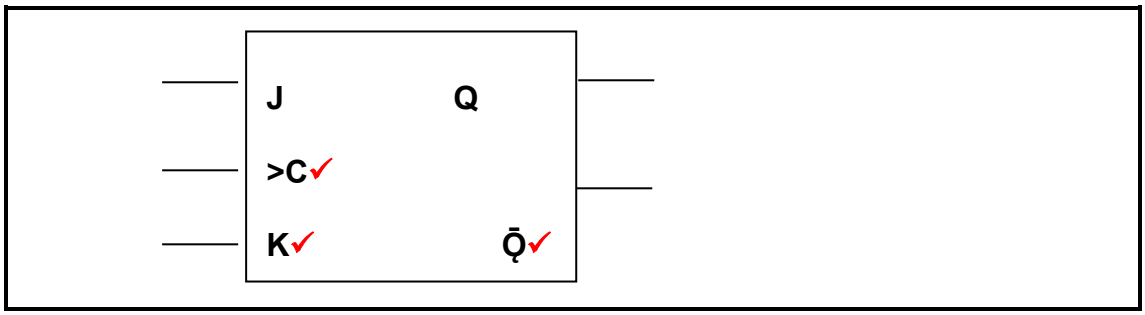
2	137		
2	68	r 1	✓
2	34	r 0	✓
2	17	r 0	
2	8	r 1	
2	4	r 0	
2	2	r 0	
2	1	r 0	
	0	r 1	

$137_{10} = 10001001_2$ ✓

(3)

4.3 A shift register is a sequential logic device made up of a cascade of flip-flops, through which a sequence of bits is shifted. (2)

4.4



(3)
[13]

QUESTION 5

5.1 7 > 7 AND (8 < 10) OR P✓
FALSE AND TRUE OR FALSE✓
FALSE OR FALSE✓
FALSE✓ (4)

5.2 5.2.1 A number with either a negative or a positive sign

5.2.2 A whole number, either positive or negative and including zero

5.2.3 Number that contains floating decimal points

5.2.4 A single symbol with a value that cannot be used in calculations

5.2.5 An array is a data structure that contains a group of elements

(5 × 1) (5)
[9]

QUESTION 6

6.1
- It stores data permanently.
- It allows easier reporting.
- It allows the ability to normalise tables and that makes it easier to maintain data.
- Data can be queried.
- Data is stored in a flexible manner.
- Reduced data redundancy.
- Reduced updating errors and increased consistency.
- Greater data integrity and independence from application programs.
- Improved data access to users through use of host and query languages.
- Improved data security.
- Reduced data entry, storage and retrieval costs.

(Any 4 × 1) (4)

6.2
- Foreign key

It acts as a cross reference between tables, because it references the primary key of another table,✓ thereby establishing a link between them.✓

- Alternate key

Or secondary key✓ is a key that has not been selected to be the primary key, but is a candidate key. It may be a key associated with one or more columns whose values uniquely identify every row in the table.✓

OR

It is a secondary key,✓ besides a primary and a foreign key and is used to enhance the performance of a database.✓

(2 × 2) (4)

6.3 6.3.1 1 to M
Or
M to 1 (1)
6.3.2 1 to 1 (1)
6.3.3 ParentClassTeacherCode (1)
6.3.4 Date of Birth (1)
[12]

QUESTION 7

7.1 When the data structure contains large amounts of data (1)

7.2
- Bubble sort will start from the beginning of the data and will
- compare the first two values (33 and 50).
- The smaller value will be placed in the first element.
- Then it will compare the second and the third value (50 and 12) and
- will swap them to put the smaller value in the second element.
- It will do so until all the data are sorted in an ascending order.

(Award marks for the correct steps of the algorithm.) (5)

7.3
```
' Swapping of numbers
  t = a   ✓
  a = b   ✓
  b = t   ✓
```
(3)

7.4 sorted (1)
[10]

QUESTION 8

8.1 Refers to the condition that occurs when a computer attempts to represent a number that is too small for it (in other words, a number too close to zero). (2)

8.2 They guide the user✓ to enter data in the correct type and format.✓ (2)

8.3 8.3.1 Index-out-of-range error
8.3.2 Conversion error
8.3.3 Data/type mismatch error (3 × 1) (3)

8.4 A parity bit, or check bit, is a bit added to a string of binary code✓ to ensure that the total number of 1-bits in the string is even or odd.✓ Parity bits are used as the simplest form of error detecting code. There are two variants of parity bits: even parity bit and odd parity bit.✓

Also accept a description of the use / or an example (3)
[10]

QUESTION 9

9.1

I	P	O
Mass✓ Acceleration ✓	Force = mass * acceleration✓	Force✓

(4)

9.2

i	j	lstDisplay
1		
	1	
		1 ✓
2		
	1	2
	2	4 ✓
3		
	1	3
	2	6 ✓
	3	9 ✓
✓ All i column values correct	✓✓ All j column values correct	

(7)
[11]

QUESTION 10

10.1
- Range checks
- Using check sums
- Input masks
- Ensuring that all required data was entered
- Logical or common sense checks

(Any 3 × 1) (3)

10.2
- Keep your screens simple and uncluttered.
- Label all screen objects.
- Provide tool tips for all input fields.
- Keep the output area separate from the input area.
- The layout of the screen should be as natural as possible to support the logical order in which users would want to input data.

(Any 4 × 1) (4)

10.3 The science of how users interact with computers (1)

10.4 Putting the user's requirements first and taking into account the user's skills and knowledge.

OR

User-centered design (UCD) is an iterative design process in which designers focus on the users and their needs in each phase of the design process (2)
[10]

TOTAL SECTION B: 75
GRAND TOTAL: 100

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