



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE (VOCATIONAL)**

**SUPPLEMENTARY EXAMINATION 2013**

**MACHINE MANUFACTURING  
NQF LEVEL 3**

**12 MARCH 2013**

**This marking guideline consists of 7 pages.**

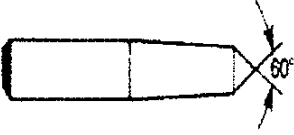
**SECTION A****QUESTION 1**

- |      |         |             |
|------|---------|-------------|
| 1.1  | False ✓ | (1)         |
| 1.2  | True ✓  | (2)         |
| 1.3  | True ✓  | (1)         |
| 1.4  | False ✓ | (1)         |
| 1.5  | True ✓  | (1)         |
| 1.6  | True ✓  | (1)         |
| 1.7  | False ✓ | (1)         |
| 1.8  | True ✓  | (1)         |
| 1.9  | False ✓ | (2)         |
| 1.10 | False ✓ | (2)         |
| 1.11 | True ✓  | (1)         |
| 1.12 | False ✓ | (1)         |
|      |         | <b>[15]</b> |

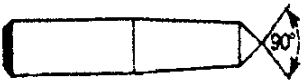
**QUESTION 2**

- 2.1
- Some programs are expensive
  - Initial costs of hardware can be high
  - Heavy computing power is required
  - CAD packages are complicated and take some time to learn
- (ANY TWO ✓✓) (2)
- 2.2 CAD is a computer package that can be used not only for drawing but also for design and manufacture. ✓
- It is also to draw two-dimensional and three-dimensional drawings. ✓
- Some programmes are designed such that they can calculate stress in materials and structures and can be used for CNC programming. ✓ (3)

- 2.3 2.3.1 True ✓ (1)
- 2.3.2 False ✓ (1)
- 2.3.3 True ✓ (1)
- 2.3.4 True ✓ (1)
- 2.3.5 True ✓ (1)
- 2.4 2.4.1 Construction line – produces a line through two points and has infinite length ✓ (1)
- 2.4.2 Rectangle – used to draw a rectangle or a square in which the sides are vertical or horizontal ✓ (1)
- 2.4.3 Trim – it allows you to trim or cut an object exactly at the edge defined by another object or line ✓ (1)

- 2.5
- 

Dotting punch

(1)
- 

Centre punch


(1)
- [15]**

**TOTAL SECTION A: 30**

**SECTION B**

**QUESTION 3**

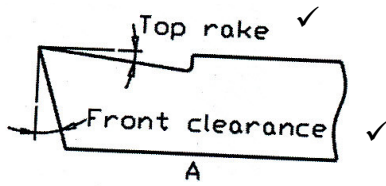
- 3.1 3.1.1 50.00 ✓ (1)
- 3.1.2 50.03 ✓ (1)
- 3.1.3 50.03 ✓ (1)
- 3.1.4 0.06 ✓ (1)
- 3.1.5 49.97 ✓ (1)

- 3.2 3.2.1 45 - Nominal size ✓ (1)
- 3.2.2 H - Tolerance on the hole ✓ (1)
- 3.2.3 7 - Grade of the tolerance of the hole ✓ (1)
- 3.2.4 g - Tolerance on the shaft ✓ (1)
- 3.2.5 6 - Grade of the tolerance of the shaft ✓ (1)
- 3.3 International Standards Organization (1)
- 3.4 Manufacturing industry needs an international acceptable system which will help them facilitate manufacturing in terms of exports and imports ✓✓ (2)
- 3.5 Countersink ✓ Counter bore ✓
- 
- (2)  
**[15]**

**QUESTION 4**

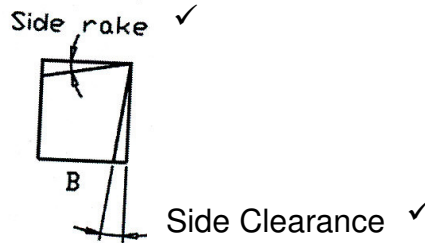
- 4.1
- Cutting lip angles are symmetrical to the centre of the drill bit
  - Cutting lip lengths are equal
  - Swarf coming out of each flute are evenly spaced
- (ANY TWO ✓✓) (2)
- 4.2 4.2.1 Too high ✓ (1)
- 4.2.2 Too low ✓ (1)
- 4.2.3 Correct height ✓ (1)
- 4.3
- Graduated handwheel – its accuracy depends on the state or condition of moving slide, tailstock, carriage and compound slide ✓
  - DRO – have various options such as switching between metric and imperial, memory and calculation function
  - DRO – enable the user of the machine to read the position of the tool at any point on the machine
- (ANY ONE OF DRO ✓) (2)

4.4 4.4.1



(2)

4.4.2



(2)

- 4.5
- Keep the cutting tool and workpiece cool
  - Allows higher cutting speed
  - Increases the lifespan of the cutting tool
  - Imparts a smooth finish
  - Productivity increases
  - Washes away chips and cuttings

(ANY FIVE ✓✓✓✓✓)

(5)

- 4.6
- Tool should be set slightly below the centre and overhang be small as possible
  - The speed should be reduced to about half the turning speed and be fed by hand and not automatic
  - Parting should be so close to the chuck as possible
  - Use lots of coolant
  - Slowly advance the parting tool into the workpiece
  - Again advance the parting tool so that it penetrates a distance equal to its length
  - Repeat the above until the workpiece is separated.

(ANY FOUR ✓✓✓✓)

(4)

[20]

**QUESTION 5**

- |     |       |  |  |     |
|-----|-------|--|--|-----|
| 5.1 | 5.1.1 | CENTRE LATHE   | MILLING MACHINE  | (2) |
|     |       | It is clamped by means of chuck and the chuck key either a 3-jaw chuck or a 4-jaw chuck. ✓ | It is clamped on machine vice with parallels underneath or is clamped by means of dividing lead. Sometimes depending on type of machining to be done a set of clamps with nuts and bolts ✓ |     |
- 
- |       |  |  |     |
|-------|--|--|-----|
| 5.1.2 | CENTRE LATHE   | MILLING MACHINE  | (2) |
|       | H.S.S. is ground to angles and used for cutting using lots of coolant/cutting oil to keep the tool cool. ✓ | The cutting tool is bolted on the machine spindle and set at required speed. There are different types of cutters e.g. end mill, slot drill. ✓ |     |
- 
- |       |                        |                        |     |
|-------|------------------------|------------------------|-----|
| 5.1.3 | CENTRE LATHE           | MILLING MACHINE        | (2) |
|       | A footbrake is used. ✓ | A handbrake is used. ✓ |     |
- 5.2 Indexing =  $N/9$  degrees ✓  
=  $35/9$  ✓  
= 3 and  $8/9$ , therefore  $8/9 \times 3/3 = 24/27$  ✓  
= 3 full turns + 24 holes on a 27-hole circle plate ✓✓ (5)
- 5.3
- He needs to decide what operation must be started first and how the work-piece is to be held ✓
  - The type of material to be used ✓
  - Must decide on the type of cutter to be used i.e. end mill/slot drill ✓
  - If grinding is involved, how much provision for excess material ✓
  - Select all measuring tools i.e. verniers, micrometers ✓
  - Do calculations and work out the required speeds and feeds ✓ (6)
- 5.4
- Drill bit improperly grounded ✓
  - Too much heavy feed ✓
  - Drill is clogged with chips ✓
  - Insufficient coolant being used ✓
  - Incorrect coolant being used ✓
  - Blunt drill bit ✓ (6)

- 5.5 A – adjuster ✓  
B – travelling steady ✓  
C – support ✓  
D – workpiece ✓  
E – carriage ✓ (5)
- 5.6 A – motor ✓  
B – head ✓  
C – table ✓  
D – saddle ✓  
E – knee ✓  
F – column ✓  
G – base ✓ (7)  
[35]

**TOTAL FOR SECTION B: 70**  
**GRAND TOTAL: 100**