higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

NOVEMBER EXAMINATION

MACHINE MANUFACTURING
NQF LEVEL 3

20 NOVEMBER 2014

This marking guideline consists of 7 pages.

SECTION A

QUESTION 1

1.1 To avoid accidents
Prevent contact with the machine
Some machines cannot operate unless the guard is closed ✓ ✓ ✓
Improve production and efficiency (Any 3 x 1) (3)

1.2 Because the rotating parts of the <u>machine can catch the loose clothes</u> ✓
resulting in injury or <u>one can slip on the floor</u> and get injured by the machine. (2)

1.3 There must only be one operator on the machine at a time.
No person should work alone.
Never lean or sit on a machine.
Never touch rotating parts of the machine.
Use all the guards and safety equipments provided. ✓ ✓ ✓ ✓
Never use a machine without permission or correct training.
(Any FOUR) (4)

1.4 Red. It is a warning sign; all warning signs must be red to alert danger. (2)

1.5 A safe route through a workshop
The easiest direction to an emergency exit ✓
Position of first aid equipment ✓
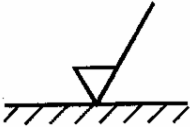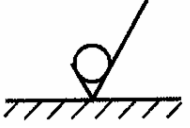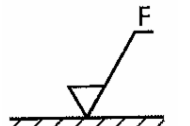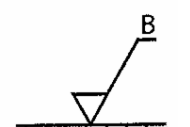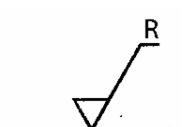Position of fire equipment so that the area must be left clear ✓ (4)
[15]

QUESTION 2

2.1 To draw or produce a two- or three-dimensional drawing to be manufactured.
It can be used to calculate stresses in the materials. ✓ ✓
It can also be used for CNC programming. (Any 2 x 1) (2)

2.2 Very suitable for repetitive work
Drawing is fast and accurate
Drawing can be upgraded or altered easily
2D and 3D drawings are made easily
Storage is done digitally taking up very little space ✓ ✓✓ ✓ ✓
Drawing can be e-mailed to others easily (Any 5 x 1) (5)

2.3 A – Tool set to high ✓

B – Tool set to low ✓

C – Tool set correctly ✓

(3 x 1) (3)

2.4   2.4.1   *Circle* is used to make circular figures. ✓

         2.4.2   *Polyline* is used to make continuous lines. ✓

         2.4.3   *Off-set* is used to produce parallel lines. ✓

         2.4.4   *Polygon* is used to produce a figure with a number of sides. ✓

         2.4.5   *Fillet* is used to create bends between two lines or arcs. ✓
                                                                (5 x 1)   (5)
                                                                             [15]

                                              TOTAL SECTION A: 30

SECTION B

QUESTION 3

3.1   *Interference fit* is the fit obtained when a shaft is bigger than a hole.   (1)

3.2   3.2.1   *Running fit* is obtained where two mating components fit into each
                    other smoothly but not loosely ✓

         3.2.2   *Sliding fit* is obtained where two mating components slide freely
                    forward and backward over each other ✓

         3.2.3   *Push fit* is obtained when some slight force by hand is applied ✓

         3.2.4   *Driving fit* is obtained if medium pressure is applied to let the parts
                    fit into each other ✓

         3.2.5   *Shrink fit* is obtained when a smaller hole is expanded by heat then
                    placed in position over the shaft and allowed to cool down ✓
                                                                (5 x 1)   (5)

3.3   3.3.1   Upper limit = 150 + 0.03 = 150.03 mm ✓

         3.3.2   Lower limit = 150 – 0.03 = 149.97 mm ✓

         3.3.3   Tolerance = 0.03 – (-0.03) = 0.06 mm ✓

         3.3.4   Lower deviation = 150 – 149.97 = 0.03 mm ✓
                                                                (4 x 1)   (4)
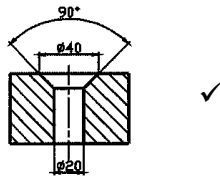
3.4   3.4.1

 ✓

3.4.2

 ✓

3.4.3

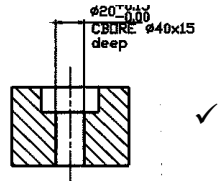 ✓

3.4.4

 ✓

3.4.5

 ✓

(5 x 1)   (5)
[15]

QUESTION 4

4.1   Keeps the cutting tool and work piece cool
Allows higher cutting speed
Increases the life of the tool
Washes away chips and cuttings
Imparts a smooth finish   ✓✓ ✓ ✓✓
Production rates are increased   (Any 5 x 1)   (5)

4.2   V = (3.142 * D * N)/60 (π = 3.142)
= (3.142 * 0.025 * 145)/60 ✓
= 0.19 m/s   ✓
= 0.19 * 100
= <u>190 mm/s</u> ✓   (4)
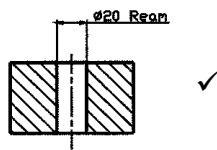
4.3   4.3.1   Countersinking

✓

       4.3.2   Counterboring

✓

       4.3.3   Reaming

✓

       4.3.4   Spot facing
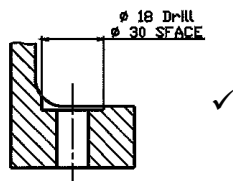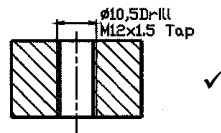

✓

       4.3.5   Tapping threaded hole

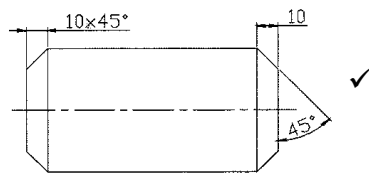
✓

       4.3.6   Chamfering

✓

                                                      (6 x 1)   (6)

4.4   1 – Body   ✓
         2 – Flute length   ✓
         3 – Overall length   ✓
         4 – Diameter   ✓
         5 – Straight shank or Parallel shank   ✓   (5)
                                                        [20]

QUESTION 5

5.1   Parallel turning
        Facing
        Tapering
        Screw turning
        Parting off
        Profile cutting
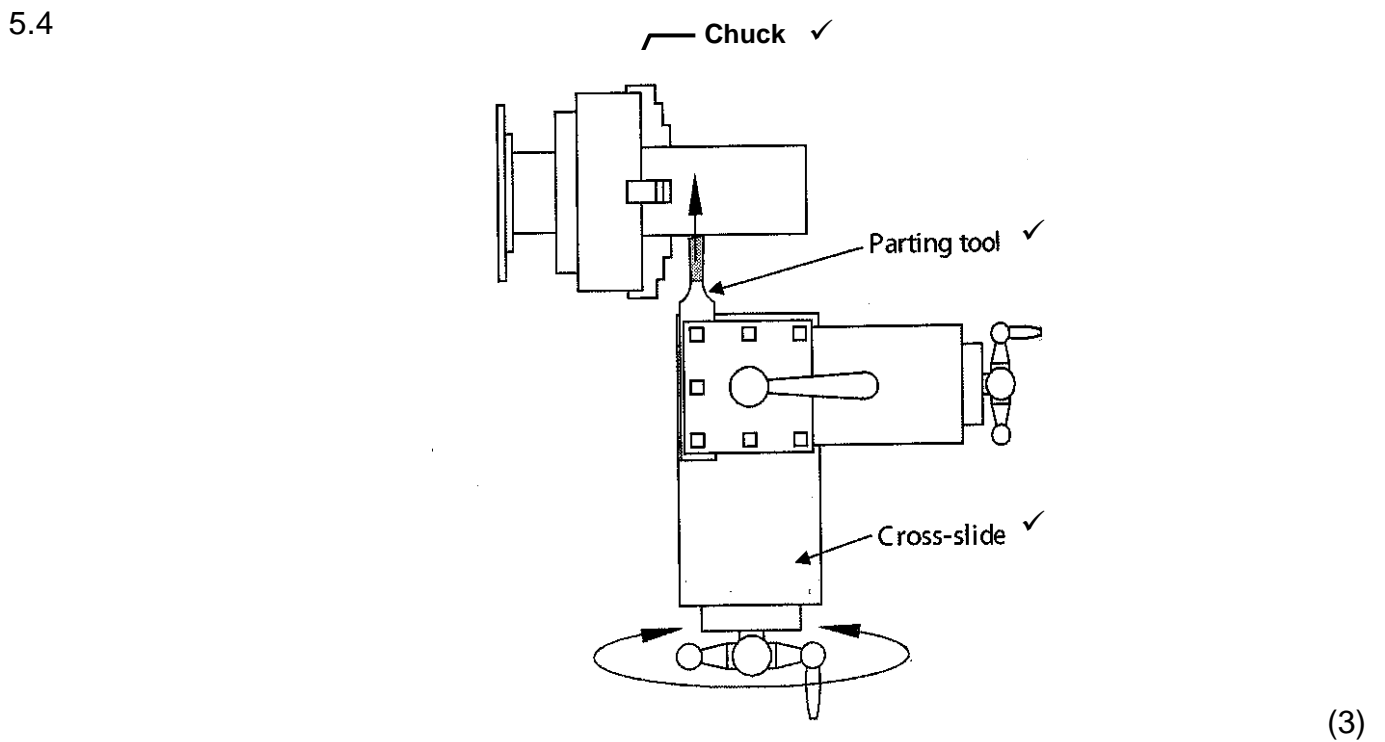   Drilling
        Chamfering
        Boring   ✓✓✓
        Knurling   (Any 3 x 1)   (3)

5.2   Long workpieces can be turned
        Easy to set up
        Can be used for tapering
        Easy to remove and replaced accurately   ✓ ✓ ✓
        Whole length can be turned   (Any 3 x 1)   (3)

5.3   1 – Carriage   ✓
        2 – Workpiece   ✓
        3 – Support   ✓
        4 – Travelling steady   ✓
        5 – Adjuster   ✓   (5)

5.4

Chuck ✓

Parting tool ✓

Cross-slide ✓

(3)

5.5   Drilling
Making keyways or slotting
Indexing
Helical cutting   ✓ ✓ ✓ ✓
Milling   (Any FOUR)   (4)

5.6   Study the drawing and instructions
Check the tool and the equipment needed
Do the calculations
Do the machining process
Inspect the job quality   ✓ ✓ ✓ ✓ ✓
Keep records   (Any FIVE)   (5)

5.7   Indexing = N/9 degrees
= 35/9 ✓   ✓
= 3 and 8/9, therefore {(8/9) * (3/3)} = 24/27
= 3 Full turns and 24 holes on a 27-hole circle plate. ✓ ✓   (5)

5.8   1 – Motor ✓
2 – Head ✓
3 – Table ✓
4 – Saddle ✓
5 – Knee ✓
6 – Column ✓
7 – Base ✓   (7)
[35]

TOTAL SECTION B: 70
GRAND TOTAL: 100