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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FITTING AND MACHINING THEORY N1

12 April 2021

This marking guideline consists of 6 pages.

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SECTION A: GENERAL PRACTICE

QUESTION 1: OCCUPATIONAL SAFETY

1.1
- Disseminate harmful amounts of dust
- Cause injury to persons
- Clean the body of person or the clothes worn by him (3)

1.2
- Adequate ventilation must be provided
- Other effective measures must be taken to safeguard persons (2)

[5]

QUESTION 2: MEASURING INSTRUMENTS

2.1
- The telescopic gauge is inserted into the item (at a slight angle) to be measured.
- Straighten the gauge within the item and lock the gauge.
- Remove the gauge and measure with an outside micrometre. (3)

2.2
2.2.1 True
2.2.2 False
2.2.3 False
2.2.4 True

(4 × 1) (4)

2.3 Used to measure the depths of holes, slots,✓ recesses and the distance of stepped faces from each other.✓ (2)

2.4 Used for accurate measurements✓ and when accurate marking is required.✓ (2)

[11]

QUESTION 3: SCREW THREADS

3.1 A single thread is a thread that has a lead equal to the pitch, which means it has just one starting point. (2)

3.2 An external thread is a thread on the outside of a part,✓ for example a bolt and an internal thread is a thread on the inside of a part,✓ for example a nut. (2)

3.3 $D = 0.613 \times p$
$= 0.613 \times 8$ ✓
$= 4{,}9$ mm ✓ (2)

[6]

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QUESTION 4: HAND TOOLS

4.1
- Single cut
- Double cut
- Rasp cut
- Curved cut (Any 3 × 1) (3)

4.2 4.2.1 They are used to file large internal corners of pipes.

4.2.2 They are used to make sharp internal corners, to sharpen the teeth of a saw.

4.2.3 They are used to make internal slots and rectangular holes.
(3 × 1) (3)
[6]

QUESTION 5: METALS AND PLASTICS

5.1
- Brass
- Bronze
- Solder
- White metal
- Duralumin (Any 4 × 1) (4)

5.2
- Lead cables
- Pipes
- Bullets
- Roof covering (4)

5.3
- Cutting tools
- Reamers
- Taps
- Drills (Any 2 × 1) (2)

5.4 A metal is a plastic when, with the removal of a load,✓ permanent deformation is retained.✓ (2)
[12]

QUESTION 6: MARKING OFF

6.1
- Marking blue
- Gentian violet mixture
- Copper sulphate
- Chalk (Any 3 × 1) (3)

6.2 Used to scribe large circles (1)

6.3 Scriber (1)
[5]

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QUESTION 7: KEYS AND KEYWAYS

7.1 7.1.1 Woodruff key

7.1.2 Used on parts that have to be removed from time to time.
(2 × 1) (2)

7.2 t = D/6
= 250/6✓
= 41.67 mm✓

w = D/4
= 250/4✓
= 62.5 mm✓ (4)
[6]

QUESTION 8: FASTENERS

8.1
- A small hole is drilled through the bolt above the nut.
- A split pin is pushed through the hole.
- The legs of the split pin are then bent around the bolt to prevent the split pin from coming out . (3)

8.2 A flat washer keeps the work surface from being damaged by the nut. (1)
[4]

QUESTION 9: HAND TAPS, STOCKS, DIES AND REAMERS

9.1
- Tap out of alignment with the hole
- Feed pressure incorrect
- Core hole too small
- Incorrect tap for the material
- Tap hitting bottom of blind hole
- Tap reversed carelessly
- Lubrication lacking or wrong lubrication
- Excess material not cleared away (Any 3 × 1) (3)

9.2 Reamers are used to remove material from holes to obtain a hole that is true round✓ with a good finish.✓ (2)
[5]

TOTAL SECTION A: 60

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SECTION B

QUESTION 10: DRILLING MACHINES

10.1
- Keeps the drill and workpiece cool
- Allows higher cutting speeds
- Increases the life of the drill
- Washes away chips and cuttings
- Imparts a smooth finish
- Production rates are increased (Any 2 × 1) (2)

10.2 D = 13 mm
N = 612 rpm

$$N = \frac{1000\ S}{\pi D}$$

$$S = \frac{N\pi D}{1000}\ \checkmark$$

$$= \frac{612 \times \pi x\ 13}{10000}\checkmark$$

= 24.999m/min✓

$$= \frac{24.99 \times 60}{1000}\checkmark$$

=1.5mm/sec✓ (6)

10.3 It means that the drill will remove 1,5 mm for every second passed. (2)
[10]

QUESTION 11: GRINDING MACHINES AND MACHINE CUTTING TOOLS

11.1
11.1.1 key
11.1.2 spindle
11.1.3 wheel
11.1.4 blotting paper
11.1.5 spindle nut
11.1.6 bush
11.1.7 flange

(7 × 1) (7)

11.2 The tool rest supports the workpiece when grinding. (1)

11.3 The spindle has a left-hand thread at one end and a right-hand thread at the other end to prevent the spindle nut from loosening✓ during cutting.✓ (2)
[10]

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QUESTION 12: THE CENTRE LATHE

12.1
- Ease of work setting
- A wide range of cylindrical and hexagonal workpieces can be held
- Internal and external jaws are available
- Work can be readily performed on the end face of the job
- Work can be bored (Any 3 × 1) (3)

12.2
- Accuracy decreases as chuck becomes worn
- Accuracy of concentricity is limited when work is reversed
- 'Run-out' cannot be corrected
- Soft jaws can be turned up for 2nd operation work but this is seldom economical for one-off jobs
- Only round and hexagonal components can be held (Any 3 × 1) (3)

12.3
- Set over the compound slide
- Tailstock set over (2)

12.4
- The chips curl away better.
- Only left cutting edge is used.
- The right flank of the thread is polished in the process. (Any 2 × 1) (2)

[10]

QUESTION 13: THE MILLING MACHINE

13.1
- Can be used to machine flat, profile or shaped surfaces
- Can be used for drilling
- Can be used for boring
- Can cut gears
- Can generate helical or corkscrew shapes
- Can be adapted for vertical work
- It can do slotting or grooving
- To cut holes on a PCD on a turning table (Any 6 × 1) (6)

13.2 The dividing head is used to divide the circumference of the workpiece into any number of equal parts✓ and to hold the workpiece in the required position.✓ (2)

13.3 Always clockwise (1)

13.4 To rough out (1)

[10]

TOTAL SECTION B: 40
GRAND TOTAL: 100

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