higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FITTING AND MACHINING THEORY N2

30 JULY 2018

This marking guideline consists of 8 pages.

SECTION A

QUESTION 1

NOTE: Candidates should only answer QUESTION 1.1 OR QUESTION 1.2.

1.1 1.1.1 False

1.1.2 True

1.1.3 True

1.1.4 False

1.1.5 False (5 × 1) **[5]**

OR

1.2 1.2.1 False

1.2.2 True

1.2.3 False

1.2.4 False

1.2.5 True (5 × 1) **[5]**

QUESTION 2

2.1
- Axial misalignment
- Radial misalignment
- Angular misalignment (3)

2.2 2.2.1 Nylon sleeve coupling
2.2.2 Flexible couplings
2.2.3 Nylon sleeve
(3 × 1) (3)
[6]

QUESTION 3

3.1
- Standardisation and the interchangeability of parts are facilitated.
- Faulty machining and workmanship are accepted within certain limits.
- Production is accelerated.
- Production costs are cut down. (4)

3.2 Interchangeability of parts is the substitution of a manufactured part✓ with a similar part manufactured from the same drawing✓. (2)
[6]

QUESTION 4

4.1 4.1.1 The ability of the material to resist galling or seizing under poor lubrication conditions

4.1.2 The ability of the material to flow during the running-in process

4.1.3 The ability of the material to withstand the pressure experienced under loaded conditions

(3 × 1) (3)

4.2 Oil enters the bearing through an oil hole.✓ The oil is then distributed in the bearing along oil grooves.✓ (2)

[5]

QUESTION 5

5.1
- Drip-feed lubricator
- Siphon-wick lubricator
- Sight-feed lubricator
- Needle lubricator (Any 3 × 1) (3)

5.2 It is the temperature at which oil gives of vapour to burn continuously when ignited. (1)

5.3
- They control the direction of flow.
- They control the pressure of flow. (2 × 1) (2)

[6]

QUESTION 6

6.1
- They are used to prevent the leakage of steam, compressed air, oil, water or gases in a system.
- They prevent dirt and dust from entering into components of a system.

(2 × 1) (2)

6.2
- It has a low resistance to fatigue.
- It has a good resistance to acid corrosion.
- It's hardness and strength decreases at low temperatures.
- It has a low melting point.
- It has good embedability properties. (Any 3 × 1) (3)

6.3
- PVC tape
- Sisal string
- Teflon
- Copper jointing compound (4 × 1) (4)

[9]

QUESTION 7

7.1
- It is used to move a liquid from a lower to a higher level.
- It is used to impart energy to a fluid (Any 1 × 1) (1)

7.2 7.2.1
A – Outlet
B – Inlet
C – Gear
D – Casing (4 × 1) (4)

7.2.2 Rotary pump (1)
[6]

QUESTION 8

8.1 It is to compress air in a container so that it can be used for driving pneumatic power tools and machinery. (1)

8.2 As the lobed rotors turn, air is drawn into the inlet of the compressor✓. Air is then transferred along the outside, between the rotors and compressor casing towards the outlet✓. Due to the meshing of the rotors, pressure is built up at the outlet✓ and the air is forced out of the compressor✓. (4)

8.3
- Reciprocating compressors
- Rotary compressors (2 × 1) (2)

[7]

QUESTION 9

9.1 9.1.1 Caused by excessive heat or chemical fumes

9.1.2 Caused by fluid contaminating the belt

9.1.3 Caused by improper installation

(3 × 1) (3)

9.2
- Cycloid gear tooth profile
- Involute gear tooth profile (2 × 1) (2)

9.3
- Single-strand or multiple-strand roller chains
- Silent chains
- Leaf chains (3 × 1) (3)

9.4
- To reduce the speed
- To increase the torque (2 × 1) (2)

[10]

TOTAL SECTION A: 60

SECTION B

Answer any TWO of the following three questions.

QUESTION 10

10.1

HYDRAULIC SYSTEM	PNEUMATIC SYSTEM
Uses liquid	Uses air
Closed circuit – liquid returns to tank	Open-ended circuit – air released to atmosphere
Requires small cylinders	Requires large cylinders
Higher system pressure	Lower system pressure
Slower operation	Faster operation
Self-lubricating	Requires lubrication
Suitable for fire risk areas	Dangerous for fire risk areas
High operating costs	Low operating costs

(Any 3 × 2) (6)

10.2 10.2.1 

10.2.2 

10.2.3 

10.2.4 

10.2.5 

(5 × 1) (5)

10.3
- Check the oil level in the compressor.
- Ensure that air supply is cool and clean.
- Inspect the receiver for leakages.
- Open drain valve to release any moisture.
- Make sure the intake filter is always clean.
- Check hoses and fittings for leaks and damage. Any (4 × 1) (4)

10.4
- Air is readily available
- Pneumatic equipment are very reliable
- Pneumatic systems are easily adapted
- Compressed air is safer than electrical or hydraulic power
- Reciprocating motion is easily achieved in pneumatic systems
- Pneumatic systems can be easily adjusted to produce different speeds
- Installation and maintenance costs are low
- Can operate under harsh conditions (Any 5 × 1) (5)

[20]

QUESTION 11

11.1
- To support long, slender workpieces between centres
- To maintain concentricity of long workpieces while machining
- To reduce vibration or chatter, ensuring better finish of the workpiece
- To support workpieces against the pressure of heavy machining

(Any 2 × 1) (2)

11.2 11.2.1
- Long tapers can be turned
- Cross-slide can be fed automatically (2 × 1) (2)

11.2.2
- Only external tapers can be turned
- As the centres are misaligned, uneven wear takes place

(2 × 1) (2)

11.3 11.3.1 Absolute dimensioning

11.3.2 Incremental dimensioning

(2 × 1) (2)

11.4 11.4.1

$$Set - over = \frac{D-d}{2} \times \frac{length\ of\ workpiece}{length\ of\ taper}$$

$$= \frac{135-80}{2} \times \frac{340}{210} \checkmark$$

$$= 27{,}5 \times 1{,}62$$

$$= 44{,}55 \text{ mm} \checkmark$$

(2)

11.4.2

$$tan\ \frac{\theta}{2} = \frac{X}{L}$$

$$tan\ \frac{\theta}{2} = \frac{27{,}5}{210}$$

$$tan\ \frac{\theta}{2} = 0{,}131 \checkmark$$

$$\theta = tan^{-1}\ 0{,}131 \times 2 \checkmark$$

$$\theta = 14{,}92° \ or\ 14° 55' \checkmark$$

(3)

11.5 $L = f \times N \times t$

$f = \frac{L}{N \times t}$ ✓

$f = \frac{350}{110 \times 8}$ ✓

$f = 0{,}4\ mm/rev$ ✓ (3)

11.6 $S = \pi DN$
$= \pi \times 0{,}05 \times 950$ ✓
$S = 149{,}23\ m/min$ ✓ (2)

11.7
- The lead of the screw thread
- The diameter of the screw thread (2 × 1) (2)

[20]

QUESTION 12

12.1 12.1.1
A – Slitting saw
B – Side and face cutter
C – Slot drill
D – End mill (4 × 1) (4)

12.1.2
A – Cutting material to length/cutting narrow grooves or slots
B – Cut steps/cut slots
C – Cut keyways/cut blind slots
D – Milling slots/cutting profiles/facing narrow surfaces (4 × 1) (4)

12.2 $Indexing = \frac{N}{9°}$

$= \frac{65}{9}$

$= 7\frac{2}{9}$ ✓

$= 7\left[\frac{2}{9} \times \frac{6}{6}\right]$ ✓

$= 7\frac{12}{54}$ ✓

✓ ✓

$Indexing = 7\ full\ turns\ of\ the\ crank\ handle\ and\ 12\ holes\ in\ a\ 54\ hole\ circle.$ (5)

12.3 12.3.1 It is a process in which a workpiece rotates so that a number of equally spaced divisions can be machined.

12.3.2 It is a slot that is drilled on a workpiece which does not go all the way through to the other side of the workpiece

(2 × 1) (2)

12.4
- Reciprocating table
- Rotating table (2 × 1) (2)

12.5
- Coolant is dirty
- Dirt underneath the wheel guard
- Grinding wheel is too soft
- Incorrect wheel dressing
- Workpiece sliding off the magnetic chuck (Any 3 × 1) (3)

[20]

TOTAL SECTION B: 40
GRAND TOTAL: 100