higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING
NQF LEVEL 3

16 November 2022

This marking guideline consists of 6 pages.

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QUESTION 1: BEARINGS

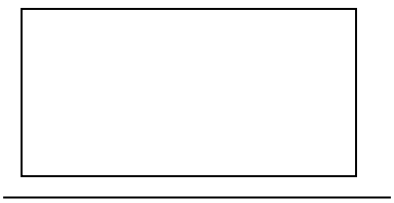
1.1
- Workers or other people won't slip and injure themselves.
- Core of good housekeeping practice.
- Allows you to work safely and efficiently. (Any 2 × 1) (2)

1.2 Advantages
- Easy to replace.
- Used where starting torques are high.
- Become noisy when they are failing.
- Can be pre-packed with grease with seals to provide for a relative maintenance-free installation.
- Can support a combination of radial and thrust loads.
- Longer-lasting/Durable.
- Generate low friction. (Any 3 × 1)

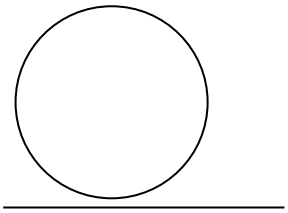
Disadvantages
- Noisier at high speeds than plain bearings.
- Initial costs are high.
- Bearings cannot be repaired, only replaced.
- High accuracy is required.
- Consists of many moving parts.
- They require a larger space to work in. (Any 2 × 1) (5)

1.3
- Induction heater method.
- Oil bath method.
- Heating lamp method. (3)

1.4



Line contact
(roller bearing)



Point contact
(ball bearing) (2 × 2) (4)

1.5
- To keep the bearing lubricant from leaking out.
- To prevent dirt and other contaminants from entering the bearing.

(Any ONE) (1)
[15]

QUESTION 2: COUPLINGS

2.1 2.1.1 Oldham coupling (1)

2.1.2 A – flange A
B – metal or rubber spacer
C – flange B
D – tongue/slipper/spigot
E – groove/recess (5)

2.2
- Excessive noise.
- Excessive vibration.
- Signs of wear.
- Lubricant leakage.
- Looseness of fasteners. (Any 4 × 1) (4)

[10]

QUESTION 3: BRAKES AND CLUTCHES

3.1 Advantages
- Compact system
- Adjustment of wear takes place automatically.
- Shoes can be on the outside or inside of the drum.
- Less expensive to manufacture.
- Usually installed on the rear wheels and can double as a parking brake.

(Any 2 × 1)

Disadvantages
- Dust or water cannot be easily thrown off from within the brake drum.
- Cannot dissipate large amounts of heat rapidly.
- Friction causes heat and wear.
- Excessive heat can result in brake failure. (Any 2 × 1)

(2 × 2) (4)

3.2
- Fluid leaks.
- Worn linings.
- Air in the system.
- Scoring of friction surface, in other words, metal-to-metal contact. (4)

3.3
- To check for any defects and must be rectified immediately.
- Any signs of wear.
- Any foreign material that could have a detrimental effect.
- Safety reasons. (Any 2 × 1) (2)

[10]

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QUESTION 4: BELT DRIVES, CHAIN DRIVES AND GEAR DRIVES

4.1
4.1.1 True
4.1.2 False
4.1.3 True
4.1.4 True
4.1.5 False

(5 × 1) (5)

4.2

ADVANTAGES	DISADVANTAGES
• Positive drive (no slip). • Compact systems. • Used for high speeds/torque • Power transmission is direct. • Maintenance costs are low. • Less quiet in operation (Any 3 × 1)	• Expensive to manufacture. • Expensive to repair. • Require constant lubrication. • Driver and driven must be close to each other. (Any 2 × 1)

(3 + 2) (5)

4.3
- Accidents are reduced.
- Injuries are reduced.
- Tools and equipment can be found easily.
- Workers are more productive.
- Space is saved.
- Saves time.
- Increases worker morale. (Any 5 × 1) (5)

[15]

QUESTION 5: PIPES, PIPE FITTINGS AND VALVES

5.1

ADVANTAGES OF PLASTIC PIPING	DISADVANTAGES OF PLASTIC PIPING
• Easy to cut and join. • Lightweight. • Flexible. • Can be made in long lengths. • Less expensive. • Resistant to corrosion. • Simple to install. • Good electrical insulator. (Any 3 × 1)	• Cannot be used for high-pressure installations. • Cannot be used for high-temperature situations. • Brittle and easily damaged. • Not rigid like metal pipes. • Cannot be used with all types of acids • Not very stable (Any 2 × 1)

(3 + 2) (5)

5.2
- Gate valve
- Diaphragm valve
- Ball valve
- Foot valve
- Non-return valve
- Pressure relief valve
- Safety valve
- Butterfly valve
- Pop safety valve
- Weight controlled valve (Any 5 × 1) (5)

[10]

QUESTION 6: CENTRE LATHE

6.1
a –Headstock
b – Carriage
c – Tailstock
d – Tool post
e – Compound slide
f – Cross slide
g – Apron
h – Feed shaft
I – Lead screw (9)

6.2
D = 10 mm = 10/1000 = 0.01m
N = 2000 rpm

S = π × D × N
= π × 0,01 × 2 000✓✓
= 62,832 m/min✓ (3)

6.3
Advantages
- Holds a wide range of cylindrical and hexagonal workpieces.
- Easy to mount a workpiece.
- Setting-up time is quick.
- Jaws can be used internally and externally. (Any 2 × 1)

Disadvantages
- Worn jaws result in inaccuracy.
- Chuck can only hold cylindrical and hexagonal workpieces.
- Impossible to correct shaft run-out.
- Gripping power of the chuck can damage the workpiece. (Any 2 × 1) (2 × 2) (4)

6.4

PROBLEMS	POSSIBLE CAUSES
• Tool breaks • Excessive tool wear • Tool chatter (Any 2 × 1)	• Wrong tool material, high feed pressure • No cutting fluid used, wrong tool angle, high feed pressure • Workpiece or tool not clamped securely, or the tool is blunt (Any 2 × 1)

(2 × 2) (4)
[20]

QUESTION 7: MILLING MACHINE

7.1
- Reduces friction and wear.
- Washes away chips and filings.
- Keeps the cutting tool and workpiece cool (prevents overheating).
- Provides a good surface finish.
- Protects against corrosion.
- Longer life of the cutting tool. (Any 5 × 1) (5)

7.2
- Roughing cutter
- End mill cutter
- Slot drill cutter
- Ball nose cutter
- T-slot cutter
- Dovetail cutter
- Radius cutter (Any 6 × 1) (6)

7.3
- Feed rate per tooth
- Number of teeth on the cutter
- Revolutions per minute (3)

7.4 D = 25 mm = 25/1000 = 0.025m
S = 45 m/min
fŧ = 0.18 mm/tooth
T = 4 teeth

$S = \pi \times D \times N$

$N = S/ \pi \times D$
$= 45/ \pi \times 0.025$✓✓
$= \underline{572,958 \text{ r/min}}$✓

$f = f\text{ŧ} \times T \times N$
$= 0.18 \times 4 \times 572,958$✓✓
$= \underline{412,53 \text{ mm/min}}$✓ (6)
[20]

TOTAL: 100

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