



# higher education & training

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

## **MARKING GUIDELINE**

### **NATIONAL CERTIFICATE MECHANOTECHNOLOGY N3**

**8 February 2022**

**This marking guideline consists of 6 pages.**

**QUESTION 1: POWER TRANSMISSION, CLUTCHES AND COUPLING OF SHAFTS**

- 1.1 1.1.1  $N_R = \frac{N_M}{N_B}$   
 $N_R = \frac{1\,300}{700} \quad \checkmark$   
 $N_R = 1,857$   
 $N_R = 1,9 \quad \checkmark$
- 1.1.2  $SF = 1,2 \quad \checkmark \checkmark$
- 1.1.3  $P_D = P_M \times SF$   
 $= 35 \times 1,2 \quad \checkmark$   
 $= 42 \text{ kW} \quad \checkmark$
- 1.1.4  $N_M = 1300 \text{ r/min}$  and  $P_D = 42 \text{ kW}$   
 $\pm D = 170 \text{ mm} \quad \checkmark \checkmark$
- 1.1.5  $n = \frac{P_D}{P_{CORRECTED POWER / BELT}}$   
 $n = \frac{42}{20,89} \quad \checkmark$   
 $= 2,0105$   
 $n = 2 \text{ belts} \quad \checkmark$
- (5 × 2) (10)
- 1.2
- Driver sprocket
  - Driven sprocket
  - Idler/jockey sprocket
- (3)
- 1.3
- It acts as a safety factor when overloaded.
  - There are no engagement shocks.
  - The engine reaches full speed quicker, with minimal electric current.
  - It is suitable for smaller motors.
  - A switch gear can be used.
- (Any 2 × 1) (2)
- 1.4
- 1.4.1 False
- 1.4.2 False
- 1.4.3 False
- 1.4.4 False
- 1.4.5 False
- (5 × 1) (5)
- [20]**

## QUESTION 2: BRAKES

- It causes great wear on components (pins, links, bushes, etc.), resulting in faulty operations.
- There is too much end thrust on the drive shaft and bearings.
- Slippage leads to surface glazing.
- Grease/oil causes eventual brake failure through slippage.
- With a smaller wedge angle, more force is required to disengage the brake.

[5]

## QUESTION 3: BEARINGS

- 3.1
- They are quiet in operation.
  - They are affordable.
  - They have a great rigidity.

(3)

- 3.2
- Taper rollers
  - Cylindrical rollers
  - Spherical rollers
  - Ball rollers

(4)

- 3.3
- A – inner ring  
B – cage  
C – roller

(3)

[10]

## QUESTION 4: WATER PUMPS, COOLING AND LUBRICATION

- 4.1 F  
4.2 K  
4.3 H  
4.4 I  
4.5 J  
4.6 B  
4.7 O  
4.8 L  
4.9 E  
4.10 A  
4.11 M  
4.12 C  
4.13 P  
4.14 D  
4.15 G

(15 × 1)

[15]

## QUESTION 5: HYDRAULICS AND PNEUMATICS

5.1

$$A = \frac{\pi d^2}{4}$$

$$A = \frac{\pi(50)^2}{4} \quad \checkmark$$

$$A = 1963,495 \text{ mm}^2 \quad \checkmark$$

5.2

$$p = \frac{F}{A}$$

$$F = 350\,000 \times 1963,495 \times 10^{-6} \quad \checkmark$$

$$F = 687,223 \text{ N} \quad \checkmark$$

5.3

$$W_D = F \times D$$

$$W_D = 687,223 \times 80 \times 10^{-3} \quad \checkmark$$

$$W_D = 54,978 \text{ J} \quad \checkmark$$

(3 × 2) [6]

## QUESTION 6: INTERNAL COMBUSTION ENGINE

A – nozzle pressure adjustment

B – valve springs

C – pressure channel

D – nozzle

E – nozzle/needle valve

[5]

## QUESTION 7: CRANES AND LIFTING MACHINES

7.1

- It provides a cushion effect on the rope.
- It supports the strands.
- It helps prevent corrosion.
- It lubricates the inside of the rope.

(4)

7.2

A – driver's cabin

B – jib

C – ballast

D – bogie

(4)

[8]

## QUESTION 8: MATERIALS AND MATERIAL PROCESSES

- 8.1
- Toughness
  - Chemical resistance
  - Flexibility
  - Low cost
  - Ability to form complex shapes with ease
  - Low density
  - Low thermal conductivity
- (Any 5 × 1) (5)
- 8.2 Non-ferrous metals are metals that do not contain iron, hence they are also non-magnetic and resistant to corrosion. E.g. tin, lead, zinc, antimony, any relevant example (2)
- 8.3
- 8.3.1 Red
- 8.3.2 Blue
- 8.3.3 Brown
- 8.3.4 Light purple
- 8.3.5 Black
- (5 × 1) (5)
- 8.4
- Material strength is improved.
  - Uniform structure is obtained in the material.
  - Steel structure is refined.
  - Strain and stresses are removed.
- (Any ONE) (1)
- [13]**

#### QUESTION 9: INDUSTRIAL ORGANISATION AND PLANNING

- 9.1
- Telephone conversations
  - Informal talks
  - Planned appointments
  - Intrapersonal communication
  - Interpersonal communication
  - Speeches
  - Television
  - Radio
- (Any 3 × 1) (3)
- 9.2
- To help transform company goals into reality
  - To plan company operations
  - To determine whether the company business goals are being met/achieved
  - To serve as a control mechanism when it comes to limiting company expenses
- (4)
- 9.3
- To prevent misunderstandings
  - To control unresolved grievances
  - To ensure uniformity in the handling of grievances
  - It helps with worker satisfaction
  - Facts are stated clearly in a written grievance
- (5)
- [12]**

## QUESTION 10: ENTREPRENEURSHIP

- 10.1.1 Finance – Capital is required by an entrepreneur to start a business. The banks and other moneylending institutions are helpful when starting a business, although their interest rates may be high, in turn making it difficult to start a business.
- 10.1.2 Knowledge and skills – understanding this concept is crucial since proper functionality of the business depends on the entrepreneur’s knowledge of the business. It is advisable that an entrepreneur starts with something he/she knows well and understands, with the skills he/she already possesses.
- 10.1.3 Contacts and friends – it is very important that an entrepreneur be connected to the right people in the right places, as these people can assist with starting a new business and growing it. They can support and advise an entrepreneur on cheaper products and suppliers, as well as other aspects of the business.

(3 × 2)

[6]

**TOTAL:**

**100**