higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

SUPPLEMENTARY EXAMINATION

FITTING AND TURNING
NQF LEVEL 4

13 MARCH 2015

This marking guideline consists of 7 pages.

QUESTON 1

1.1 1.1.1 D
1.1.2 E
1.1.3 A
1.1.4 B
1.1.5 C

(5 × 1) (5)

1.2
- Excessive lubrication
- Shock loading
- Force applied to wrong ring during installation
- Housing or shaft damaged or worn
- Dirt particles in lubricant
- Incorrect installation of bearing (Any 3 × 1) (3)

1.3 1.3.1
- Misalignment of components
- Imbalance of rotating components
- Bearing failure
- Looseness of hold down bolts on base plate; pedestal bearing bolts, etc.
- Structural weakness
- Improper fit between components
- Bent shafts (Any 2 × 2) (2)

1.3.2
- Use correct instruments to align couplings, chain drives, pulleys
- Have rotating components balanced
- Replace bearings
- Tighten all bolts or nuts properly
- Correct soft foot condition by using shims/packing
- Check that all mating components are made to specifications
- Repair, straighten or replace bent shafts (Any 2 × 2) (2)

1.4 1.4.1 Major repair (1)

1.4.2
- A substantial amount of time will be taken to remove and install a new bearing
- The machine will have to be stopped for the gearbox to be removed. (Any 1 × 1) (1)

1.5
- Space is utilised effectively
- Reduced handling to ease flow of materials
- Reduced accident risk
- Decreased fire hazards
- Improved staff morale
- Better hygienic conditions leading to improved health
- Improved productivity (tools and materials easy to find)
- Lower worker exposure to hazardous substances (dust, vapours)
- More efficient maintenance and equipment clean up
- Better control of tools and materials, including inventory and supplies

(Any 3 × 1) (3)

1.6 Preventative maintenance is the regular, scheduled maintenance performed on machines and equipment to avoid future component problems. (1)

1.7
- Breakdown of machinery or equipment
- Quality of products is not maintained
- Standard of service deteriorates
- Injury to workers

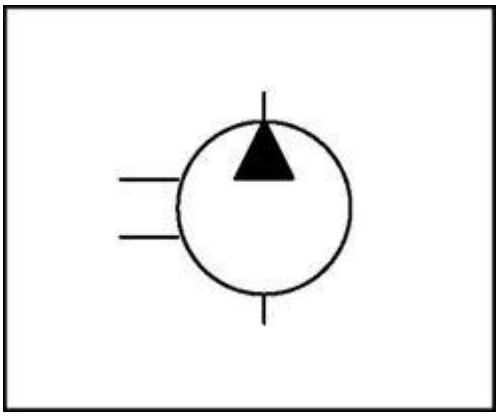
(Any 2 × 1) (2)
[20]

QUESTION 2

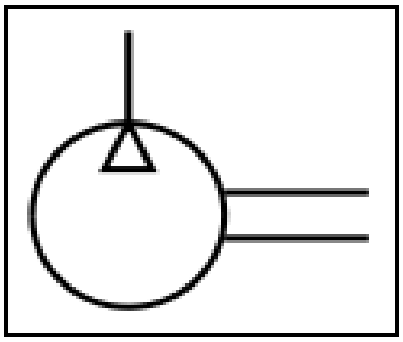
2.1
2.1.1 True
2.1.2 False
2.1.3 False
2.1.4 True
2.1.5 False

(5 × 1) (5)

2.2



HYDRAULIC PUMP



COMPRESSOR

MARK ALLOCATION			
	Correct Shape	Shading of triangle	Mark allocation
Hydraulic Pump	1	1	2
Compressor	1	1	2
TOTAL			(4)

2.3
- Uncontrolled leakage of hydraulic medium
- Accidental machine movement
- Skin diseases
- Oiled/Slippery floors – result in injury (Any 2 × 1) (2)

2.4
- Compressor/Pneumatic motor
- Air receiver
- Piping
- Valves
- Service unit
- Actuator (Any 2 × 1) (2)

2.5
2.5.1 Clean strainer/Install a new one
2.5.2 Replace with correct fluid
2.5.3 Reduce length or fit larger bore pipes.
(3 × 1) (3)

2.6
2.6.1 Pressure relief valve prevents the compressed air in the receiver from exceeding the maximum working pressure. (2)

2.6.2 The tank may rupture or explode causing injury or damage. (2)
[20]

QUESTION 3

3.1 3.1.1 D
3.1.2 C
3.1.3 B
3.1.4 C
3.1.5 C

(5 × 1) (5)

3.2 3.2.1
- The cutting edge must be exactly on centre height or minutely above centre height.
- Minimum amount of blade should protrude from tool holder.
- Part off as close to the chuck as possible.
- Cutting blade must be square to workpiece.
- Sufficient lubrication/coolant must be used. (Any 2 × 1) (2)

3.2.2
- Parting tool tip may chip/break.
- Workpiece may chatter. (Any 1 × 1) (1)

3.3 D = 0,045 mm
S = 22 m/min
S = π × D × N

$$N = \frac{S}{\pi \times D}$$ ✓

$$N = \frac{22}{\pi \times 0{,}045}$$ ✓

N = 155,618 r/min ✓
✓ = 1 mark (3 × 1) (3)

3.4
- The cutting speed
- The feed rate
- The depth of the cut
- Machinability of the material
- Grade of the cutting tool
- Condition/Power of the lathe (Any 3 × 1) (3)

3.5
- The dimensions of the finished workpiece
- The tolerances that were achieved
- The finishes that were obtained (Any 2 × 1) (2)

3.6 3.6.1 Workers can become entangled in the shaving. (1)

3.6.2
- Use cutting tools with a chipbreaker.
- Use appropriate cutting feeds and speeds.
- Ensure appropriate personal protective clothing is used. (3 × 1) (3)

[20]

QUESTION 4

4.1 4.1.1 C
4.1.2 E
4.1.3 D
4.1.4 B
4.1.5 A

(5 × 1) (5)

4.2 $S = \pi \times D \times N$

$N = \frac{S}{\pi \times D}$ ✓

$N = \frac{26 \frac{m}{\min}}{\pi \times 0{,}06\ m}$ ✓

N = 137,934 r/min ✓

f = ft × T × N
f = 0,05 × 14 × 137,934 ✓
f = 96,544 mm/tooth ✓
✓ = 1 mark (5)

4.3
- It holds the workpiece while it is being machined.
- It divides the circumference of the workpiece into a number of equal parts.
- It facilitates helical milling.
- It facilitates gear rack cutting. (2)

4.4 4.4.1
- Raise the knee so that the bottom of the end mill is just below the centre of the shaft.
- Rotate the end mill and move the cross feed until the cutter just touches the side of the shaft.
- Lower the table so that the bottom of the cutter clears the top of the shaft.
- Use the graduated sleeve and move the table over a distance equal to half the shaft diameter plus half the thickness of the end mill. (4 × 1) (4)

4.4.2 Slotting cutter or side and face cutter (1)

4.4.3 Vernier calliper or depth micrometer (1)

4.4.4
- To locate pulleys to shafts
- To prevent relative motion between them
- To locate a gear on a shaft
- To locate a sprocket on a shaft (Any 2 × 1) (2)

[20]

QUESTION 5

5.1
5.1.1 True
5.1.2 True
5.1.3 False
5.1.4 False
5.1.5 True

(5 × 1) (5)

5.2
- Surface area to be ground
- The type of material to be ground
- The capacity of the machine
- The degree of accuracy/precision required
- The need for coolant
- The wheel speed/work rate

(Any 2 × 1) (2)

5.3 5.3.1
- Safety glasses
- Goggles
- Face shield

(Any 1 × 1) (1)

5.3.2
- Dirty coolant
- Loose dirt particles from under the wheel guard
- Grinding wheel too soft
- Grinding wheel too coarse
- Sliding workpiece off magnetic chuck

(Any 2 × 1) (2)
[10]

QUESTION 6

6.1
6.1.1 C
6.1.2 D
6.1.3 E
6.1.4 A
6.1.5 B

(5 × 1) (5)

6.2
- CNC machines require skilled operators.
- Costly setup
- Computer and programming knowledge required
- Maintenance is difficult/expensive
- Costly to set up for one item

(Any 2 × 1) (2)

6.3
- The dimensions
- The finish
- The shape

(Any 2 × 1) (2)

6.4
- Maintain a safe working environment.
- Maintain an environment that promotes the health of workers.

(Any 1 × 1) (1)
[10]

TOTAL: 100