



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING NQF LEVEL 4

(6011044)

**12 March 2018 (Y-Paper)
13:00–16:00**

This question paper consists of 7 pages

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

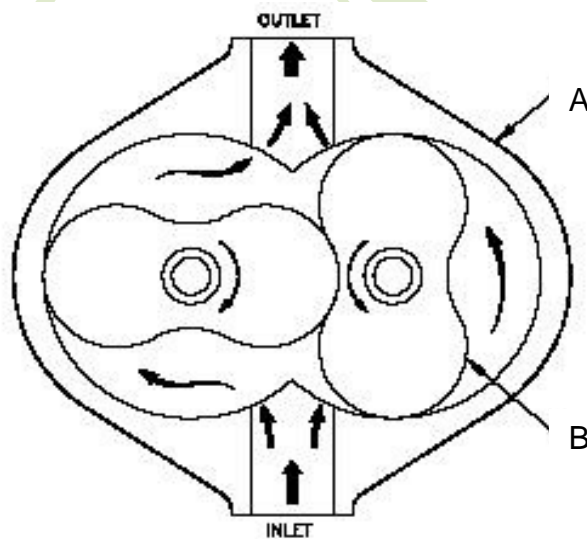
1. Answer ALL the questions.
 2. Read ALL the questions carefully.
 3. Number the answers according to the numbering system used in this question paper.
 4. Write neatly and legibly.
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QUESTION 1: PUMPS

- 1.1 List any THREE health and safety workshop precautions that are applicable to pumps. (3)
- 1.2 Name TWO types of rotary pumps. (2)
- 1.3 Explain the working principle of the vane pump. (3)
- 1.4 Name TWO reasons why it is important to conduct quality checks after every job on pumps are completed. (2)

[10]**QUESTION 2: COMPRESSORS**

- 2.1 List TWO reasons why it is important for employees to adhere to and to promote the Occupational Health and Safety Act. (2)
- 2.2 List THREE functions of an air compressor. (3)
- 2.3 Study the drawing of a type of compressor below and answer the questions.



- 2.3.1 Give the name of the compressor. (1)
- 2.3.2 Identify the TWO parts A and B. Write only the names Next to A and B in your ANSWER BOOK. (2)
- 2.3.3 Indicate whether it is a positive or negative displacement compressor. (1)

2.4 When doing inspection you need to make sure that the compressor parts are cleaned properly before been replaced.

Name the method you can apply to clean them.

(1)
[10]

QUESTION 3: HYDRAULIC AND PNEUMATICS

3.1 List FOUR reasons why pneumatic systems are sometimes preferred over hydraulic systems.

(4)

3.2 When installing hydraulic pumps and motors you have to be a qualified artisan because all motors and pumps have specific operation and maintenance procedures.

Name the guidelines that you need to follow when installing hydraulic pumps and motors.

(5)

3.3 Name FOUR areas that you would check for excessive air leaks in a pneumatic system.

(4)

3.4 Draw neat labeled diagram of a simple hydraulic system which contains the following parts:

- Pump
- Valve
- Reservoir
- The actuator (cylinder)

NOTE: That the parts should be drawn in their symbolic form.

(8)
[21]

QUESTION 4: SURFACE GRINDING

4.1 Protective equipment should be worn by an operator before using the surface grinding machine safely.

Name any FIVE such equipment needed.

(5)

4.2 In your own understanding of the surface grinding machine, explain what you understand by the following:

4.2.1 Peripheral grinding

4.2.2 Face grinding

(2 x 1) (2)

- 4.3 When an operator notices any one of the following problems on the workpiece as indicated below during a grinding operation, he/she needs to take action immediately by reporting the problem.

Give ONE reason for each of the problems.

- 4.3.1 Burn marks
 4.3.2 Chatter marks on the workpiece
 4.3.3 Scratches on the workpiece

(3 × 1) (3)
[10]

QUESTION 5: CENTRE LATHE

- 5.1 Various options are given as possible answers to the following questions. Write only the letter (A–D) next to the question number (5.1.1–5.1.3) in the ANSWER BOOK.

- 5.1.1 Dikobe wants to measure the inside depth of a bush. He must use the following tool:

- A Inside micrometer
- B Vernier caliper
- C Vernier height gauge
- D Dial gauge

- 5.1.2 Which ONE of the following tools would you use if you are required to machine a 60 mm internal diameter on a brass bush?

- A Thread cutting tool
- B Parting tool
- C Drill bit
- D Boring bar

- 5.1.3 Which ONE of the following lathe attachments would you use when you are required to machine a workpiece like a pipe or tubing with a hole through it?

- A Fixed steady
- B Face plate
- C Mandrel
- D Travelling steady

(3 × 1) (3)

- 5.2 List FOUR maintenance checks that should be done before an operator start using a centre lathe.

(4)

5.3 Calculate the rotational speed in r/s when turning an aluminium round bar with a diameter of 40 mm. The cutting speed for aluminium is given as 90 m/min. (3)
 Use: $S = \pi \times D \times N$

5.4 Quality checks should be done on completed workpieces by using different measuring equipment.

Briefly explain what the following measuring equipment are used for:

5.4.1 Telescopic gauges

5.4.2 Thread pitch gauges

(2 x 1) (2)
 [12]

QUESTION 6: MILLING MACHINE

6.1 Name any TWO components of a dividing head. (2)

6.2 A milling cutter is 100 mm in diameter and has 14 teeth. The cutting speed for the material is given at 24 m/min and the feed per tooth is 0,051 mm. Calculate the feed rate.

NOTE: $S = \pi \times D \times N$ $f = \text{feed/tooth} \times \text{No. of teeth} \times r/\text{min}$ (5)

6.3 Calculate the indexing required to machine a number of grooves into a shaft when the angle measured between the grooves is 50°.

$\text{INDEXING} = \frac{\theta}{9^\circ}$ or $\frac{40}{N}$

DIVIDING HEAD											
CINCINNATI INDEX PLATES											
SIDE 1	24	25	28	30	34	37	38	39	41	42	43
SIDE 2	46	47	49	51	53	54	57	58	59	62	66

(3)

6.4 Name TWO things that an artisan must do to avoid breaking a milling cutter during a milling operation. (2)
 [12]

QUESTION 7: MILLING AND TURNING CNC

- 7.1 Give TWO advantages of the use of CNC machines. (2)
- 7.2 There are various safety devices on CNC machines that protect the operator from injury during the machining process.
Name THREE such devices and explain their function. (3 × 2) (6)
- 7.3 The CNC machine operator needs to make sure the machine and the tools are in good working condition. He/She also needs to ensure that the set-up is done according to the job specifications.
Briefly describe what he/she should check with regard to the selection and mounting of the cutting tools. (2)
- 7.4 Name the THREE pieces of equipment of a CNC production facility and give the function of each. (3)
- 7.5 Briefly explain what you understand by the following: 'Cutter Radius Compensation' during CNC programming. (2)
- 7.6 Explain why it is important to make sure that the programme has been written to correspond with the way the tools have been set up in the tool turret. (3)
- 7.7 Give the descriptions of the following G and M CNC programme codes:
7.7.1 N010 G50 S1500
7.7.2 N030 G00 X 29.6 Z5.M08 (2 × 1) (2)
- 7.8 Name TWO advantages of a clean work area after working. (2)
- 7.9 Name THREE stages you need to follow when controlling the quality of a product during the measurement stage. (3)
- TOTAL: 100**