higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING
NQF LEVEL 4

(6011044)

22 November 2024 (X-paper)
09:00–12:00

Non-programmable calculators may be used.

This question paper consists of 6 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
FITTING AND TURNING
NQF LEVEL 4
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. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1: PUMPS AND COMPRESSOR

1.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 The fundamental function of an air compressor is to compact hydraulic fluid.

1.1.2 Maintaining the correct clearance between the impeller and the pump casing minimises leakage of fluid in the pump.

1.1.3 Mechanical seals used on pumps have a predictable life span and can only be replaced once this life span has been reached.

1.1.4 One disadvantage of a diaphragm pump is that it creates a pulse in the discharge flow.

1.1.5 The purpose of an air dryer is to remove moisture by cooling compressed air down even more.

(5 × 1) (5)

1.2 Explain what action one would perform with regard to the following in the workplace:

1.2.1 Defective parts and components.

1.2.2 Accurate recording of information on a completed job.

1.2.3 Handling of equipment and tools after use.

(3 × 2) (6)

1.3 Name THREE types of positive displacement compressors used in the engineering industry. (3)

1.4 Explain the working principle of a multi-stage reciprocating air compressor. (6)

[20]

QUESTION 2: HYDRAULICS AND PNEUMATICS

2.1 List and discuss the THREE standard ISO units of measurement used in hydraulic and pneumatic systems. (6)

2.2 State ONE reason why the ingredients of cleaning agents should be clearly labelled if they are to be used safely. (2)

2.3 Mention TWO defects that will cause a hydraulic or pneumatic system not to work effectively. (4)

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2.4 Identify the components that will be used for the following purposes:

2.4.1 To generate mechanical force in a linear motion for a variety of applications.

2.4.2 To prevent dirt entering the system that can lead to blockage.

2.4.3 To control the speed of air into or out of the pneumatic system.

2.4.4 For the quick release of air from a pneumatic system.

2.4.5 Component to convert hydraulic energy into rotary energy.

(5 × 1) (5)

2.5 Draw a neat ISO symbol of the following pneumatic system components:

2.5.1 Double-acting cylinder

2.5.2 Shut-off valve

2.5.3 Flow measuring instrument

(3 × 1) (3)
[20]

QUESTION 3: GRINDING MACHINE

3.1 Mention TWO things that a surface grinder operator should do to position the components correctly on the grinding table before starting with the job. (2)

3.2 Explain the procedure to be followed when starting the surface grinding machine and setting the depth of the cut. (4)

3.3 Explain what the following aspects entail when carrying out a surface grinding operation:

3.3.1 Check machined components against specifications

3.3.2 Identify values to be checked

(2 × 2) (4)
[10]

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QUESTION 4: CENTRE LATHE AND MILLING MACHINE

4.1 List FIVE routine maintenance checks to be carried out before operating a centre lathe in a workshop. (5)

4.2 Explain the procedure to be followed to fit a selected cutter in the tool post before starting the machining process on a centre lathe. (6)

4.3 Identify the cutting operations shown in FIGURE 1 below and write your answer next to the question number (4.3.1–4.3.3) in your ANSWER BOOK.

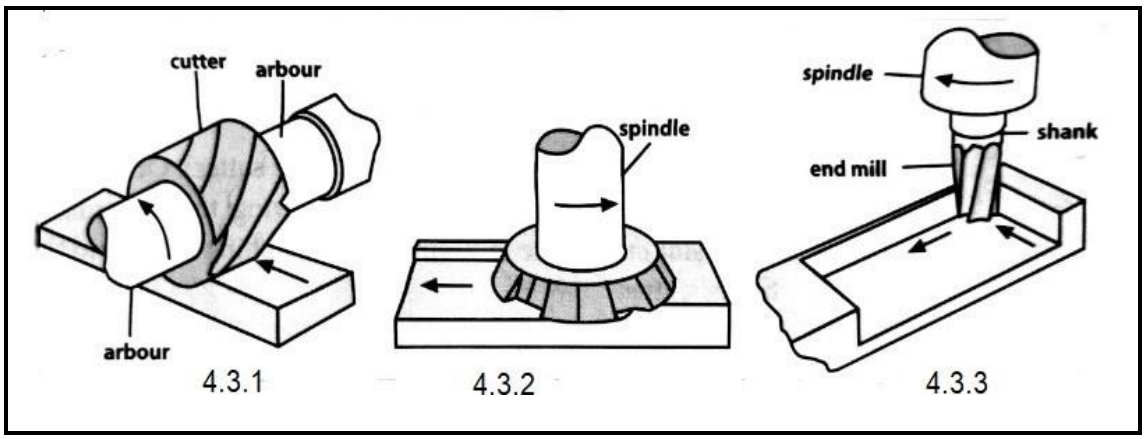


FIGURE 1

(3 × 1) (3)

4.4 List FOUR methods that can be used to identify the work piece material before any cutting process takes place. (4)

4.5 Explain how to adjust the dividing head according to the number of sides to be cut when an equal number of grooves must be cut on a round plate. (6)

[24]

QUESTION 5: CNC CENTRE LATHE AND MILLING MACHINE

5.1 List FOUR safety precautions that a CNC machine operator should consider when checking a software safety guard on tool movement. (4)

5.2 Compressed air must not be used when cleaning CNC machines, as flying chips/shavings can be dangerous to those working in the area.

List TWO ways that can be used to remove chips and debris inside the CNC machine after a workday shift. (4)

5.3 Explain how to replace a worn tip tool on a stationery machine. (2)

5.4 Explain how the following codes work:

5.4.1 G41 cutter compensation

5.4.2 G42 cutter compensation

(2 × 2) (4)

5.5 State FIVE things that should be in good working condition when inspecting the machine tools and equipment on the CNC lathe. (5)

5.6 List TWO ways that can be used to transfer a part programme from a PC to CNC controller. (4)

5.7 Calculate the feed required for a 30 mm diameter cutter with two flutes when cutting steel at 650 r/min with the recommended cut per tooth of 0,02 mm.

Use Formula: Feed = rpm × MMPT × #FL (3)

[26]

TOTAL: 100

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