higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING
NQF LEVEL 4

(6011044)

26 March 2021 (X-paper)
09:00–12:00

This question paper consists of 7 pages.

483Q1S2126

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. Start each section on a new page.
5. Write neatly and legibly.

QUESTION 1: PUMPS AND COMPRESSORS

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 Which ONE of the following is not classified as a centrifugal pump?

A Single-stage pump
B Horizontal pump
C Piston pump
D Single-suction pump

1.1.2 Which ONE of the following does not have a reciprocating characteristic?

A Piston pump
B Plunger pump
C Air-driven reciprocating pump
D Gear pump

1.1.3 Which of the following is not a type of rotary pump?

A Vane pump
B Piston pump
C Gear pump
D Helical gear screw pump

1.1.4 Which ONE of the following is not an example of functions of a compressor?

A Supply power to drive tools
B Supply power to high-pressure spray painter
C Provide air to fill vehicle tyres
D Provide air to clean the body

1.1.5 Which ONE of the following is not an example of a positive displacement compressor?

A Single-stage centrifugal compressor
B Lobe compressor
C Vane compressor
D Rotary screw compressor

(5 × 1) (5)

1.2 List FOUR potential areas of defects and wear on a pump. (4)

1.3 Explain what to look for when inspecting each of the following for non-conformance:

1.3.1 Compressor pump

1.3 2 Pipes or hoses

1.3.3 Belt drives or pulleys

1.3.4 Air filters

1.3.5 Motors

(5 × 1) (5)

1.4 State FIVE quality checks regarding maintaining or installing processes on compressors that must be carried out to ensure that the system is ready for use. (5)

1.5 Why is a lock-out switch fitted on electrical equipment? (1)
[20]

QUESTION 2: HYDRAULICS AND PNEUMATICS

2.1 Name FIVE components used in constructing a pneumatic circuit. (5)

2.2 Differentiate between *hydraulic* and *pneumatic systems* in terms of operation. (2)

2.3 What is the function of an exhaust valve in a pneumatic system? (2)

2.4 State THREE hazards that can be avoided if good health and safety practices are followed when working with hydraulic systems. (3)

2.5 Give THREE reasons for using the correct tools, equipment, clean materials and personal protective equipment when working with hydraulic systems. (3)

2.6 Name the valve used for each of the following purposes:

2.6.1 Regulating system pressure and opening when this pressure exceeds system limits

2.6.2 Maintaining constant flow rate and adjusting variable pressure

2.6.3 Protecting hydraulic system from being overloaded

2.6.4 Allowing flow of certain amount of fluid, and then stopping or limiting flow

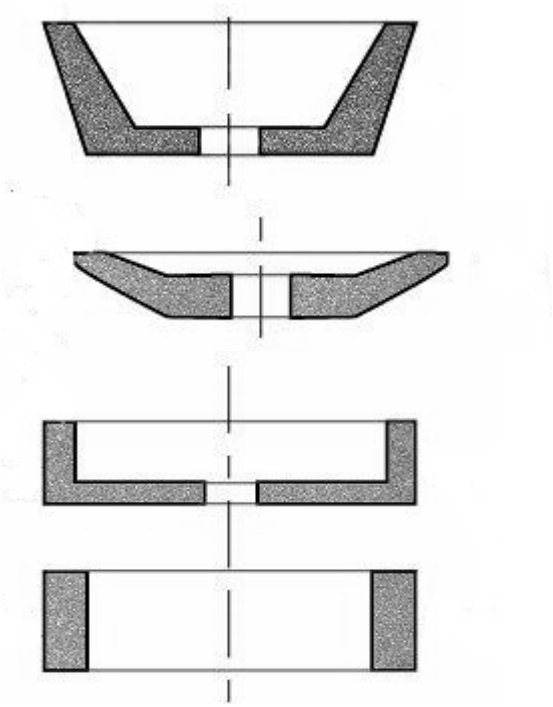
2.6.5 Allow switching off of flow for maintenance

(5 × 1) (5)
[20]

QUESTION 3: SURFACE GRINDING MACHINE

3.1 Identify each grinding wheel below by writing the answer next to the question number (3.1.1–3.1.4) in the ANSWER BOOK.

3.1.1



3.1.2

3.1.3

3.1.4

(4 × 1) (4)

3.2 What is the function of a diamond dresser? (1)

3.3 Name FIVE components that must be checked when inspecting the working condition of a surface grinding machine. (5)

[10]

QUESTION 4: CENTRE LATHE

4.1 Explain how you would mount a workpiece in a three-jaw chuck before starting machining. (3)

4.2 Name THREE essential personal protective clothing when operating a lathe. (3)

4.3 State THREE pieces of information regarding specification conformance of components that an operator must record after completing a machining job. (3)

4.4 Name TWO steps that the operator must take in preparing to start a machining process. (2)

4.5 Name the measuring instrument that can be used when setting up the workpiece and the cutting tool height on a milling machine. (1)

[12]

QUESTION 5: MILLING MACHINES

5.1 Explain step by step how a milling machine operator checks if the X-axis and the Y-axis of the table are perpendicular. (3)

5.2 Why do you have to ensure that cutting fluid is available before you start a cutting operation on the milling machine? (2)

5.3 Why it is important to mount and position the workpiece correctly before cutting or indirect indexing on the milling machine? (2)

5.4 How can a workpiece be lifted if it is lower than the vice jaws? (1)

5.5 Use a Brown and Sharpe dividing head to calculate the required indexing for a gear which should have 36 teeth machined on its circumference.

Indexing formula = $\frac{40}{N}$

BROWN AND SHARP DIVIDING HEAD						
NUMBER OF HOLES						
Plate 1	15	16	17	18	19	20
Plate 2	21	23	27	29	31	33
Plate 3	37	39	41	43	47	49

(6)
[14]

QUESTION 6: CNC CENTRE LATHES AND CNC MILLING

6.1 State FOUR requirements for cleaning a CNC machine after use. (4)

6.2 Write down SEVEN steps to be followed in sequence after having studied a given drawing for CNC machining. (7)

6.3 Explain how a machinist programs a tool offset on the X- and Z-axis of a workpiece zero point. (4)

6.4 State TWO important requirements that need to be checked when selecting cutting tools and fixtures for a machining operation. (2)

6.5 Explain the function of each cutting tool below. Write the answer next to question number (6.5.1–6.5.4) in the ANSWER BOOK.

6.5.1 Face tool

6.5.2 Flat-nose mills

6.5.3 Centre drills

6.5.4 Drill bits

(4 × 1) (4)

6.6 Explain the different stages of controlling the quality of a product during the measurement stage. (3)

[24]

TOTAL: 100