higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING
NQF LEVEL 4

SUPPLEMENTARY EXAMINATION

(6011044)

28 March 2017 (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.

QUESTION 1: PUMPS

1.1 Explain the following concerning centrifugal pump impellers:

1.1.1 The difference between *open* and *closed* impellers. (2)

1.1.2 The reason for the use of open impellers in pump applications. (1)

1.2 Explain the function of the following centrifugal pump components:

1.2.1 Volute

1.2.2 Stuffing box

1.2.3 Inlet and outlet flange

(3 × 1) (3)

1.3 Explain the working principle of a gear pump. (3)

1.4 Give ONE reason why it is important to record all information on a completed task. (1)

[10]

QUESTION 2: COMPRESSORS

2.1 Name TWO main groups into which compressors are categorised. (2)

2.2 Explain the function of the following compressor components:

2.2.1 Relief valve

2.2.2 Manifold

2.2.3 Regulator

(3 × 1) (3)

2.3 Explain why it is necessary to continuously examine potential areas of defect and wear on the compressor. (1)

2.4 Explain any THREE non-conformances that may be found during the inspection of compressor parts and indicate the corrective action that can be taken to rectify them. (3)

2.5 When installing or maintaining a compressor you must apply appropriate safety practices.

Describe ONE of these practices. (1)

[10]

QUESTION 3: HYDRAULICS AND PNEUMATICS

3.1 Explain in your own words how the process of converting electrical energy into mechanical energy in a hydraulic system is achieved. (4)

3.2 Name THREE ways in which directional control valves can be actuated. (3)

3.3 State TWO functions of hydraulic fluids. (2)

3.4 The goal of good housekeeping is to create a safe and healthy working environment.

List THREE advantages for maintaining a clean workshop. (3)

3.5 There are certain advantages and disadvantages in the use of pneumatic systems:

3.5.1 Name any THREE advantages. (3)

3.5.2 Name any TWO disadvantages. (2)

3.6 In any pneumatic system, valves are used to control various aspects in the system.

Explain what the following valves control in a pneumatic system:

3.6.1 Regulator

3.6.2 Directional control valve

3.6.3 Non-return valve

(3 × 1) (3)

[20]

QUESTION 4: SURFACE GRINDING

4.1 After completing surface grinding on a workpiece the operator must make sure that the work area is safe.

Name any THREE actions to be performed by the operator to keep the work area safe after the machine has been switched off. (3)

4.2 Name FOUR steps to be taken when using a wet-surface grinding machine to dress a grinding wheel using a diamond tool dresser. (4)

4.3 State ONE possible factor which may be the cause of the scratching of the workpiece when surface grinding is done. (1)

4.4 The artisan wants to clamp a workpiece on the magnetic chuck and discovered that the chuck is not functioning well.

Give TWO possible causes why the chuck may not function correctly. (2)
[10]

QUESTION 5: CENTRE LATHE

5.1 Give THREE reasons why it is necessary to place guards around the centre lathe. (3)

5.2 Name any TWO types of lathe cutting tools and also state what they are used for. (2 × 2) (4)

5.3 A carbon steel pin is to receive a finishing cut on a centre lathe. The cutting speed for carbon steel is 56,55 m/min.

FORMULA: $S = \pi \times D \times N$

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Calculate the diameter of the carbon steel pin in mm if the spindle speed setting is 1 800 r/min. (3)

5.4 Explain the disadvantage of using a dead centre during a lathe cutting operation. (1)

5.5 Indicate whether the following statement is TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (5.5) in the ANSWER BOOK.

'The following two types of lathe beds are available: Solid and gap beds.' (1)
[12]

QUESTION 6: MILLING MACHINE

6.1 Name TWO types of cutters used on the milling machine. (2)

6.2 Calculate the cutting speed of the cutter in metres per minute, when using a cutter of 35 mm in diameter at a speed of 360 r/min.

FORMULA: $S = \pi \times D \times N$ (3)

6.3 Use a Cincinnati dividing head to calculate the indexing required for the following:

Two V-shaped groves at an angle of 50°.

FORMULA: Indexing = $\frac{N}{9°}$

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 Explain the reason why the correct coolant must be used according to manufacturing instructions. (1)

6.5 Name ONE advantage in using each of the following on milling machines:

6.5.1 Collet

6.5.2 End mill holder

(2 × 1) (2)

6.6 Name ONE measuring instrument to be used to check if milling standards are maintained. (1)

[12]

QUESTION 7: CNC MILLING AND TURNING

7.1 Name the TWO basic instructional codes applicable to a CNC machine. (2)

7.2 Name TWO types of programming methods used on the CNC lathes. (2)

7.3 List any FOUR aspects that need to be taken into consideration before a programmer can write a simple part programme on a CNC controller. (4)

7.4 Name THREE stages when doing programming at an offline workstation. (3)

7.5 Explain the meaning of the following codes used on the CNC lathe:

7.5.1 M03

7.5.2 M30

7.5.3 G50

7.5.4 G70

(4 × 1) (4)

7.6 Why is it necessary to select the correct speed, feed and the depth of the cut on a CNC machine? (1)

7.7 Once you are sure that you understand the drawing, you need to determine the sequence in which the cutting operation will take place.

List any FIVE processes that need to be part of the machining sequence. (5)

7.8 The programme is being set on the CNC lathe and the operator notices that there are certain mistakes.

List the FIVE steps he will apply to manually edit the programme on the CNC controller. (5)

[26]

TOTAL: 100