higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING
NQF LEVEL 3

(6011043)

9 March 2018 (X-Paper)
09:00–12:00

Calculators may be used.

This question paper consists of 8 pages.

NCV

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: BEARINGS

1.1 List FOUR of the most common signs of damage that can be seen on a bearing during inspection. (4)

1.2 James has to install a bearing on a lathe in the workshop.

List any FOUR types of equipment that can be used to fit the bearing assembly. (4)

1.3 Explain with the aid of neat sketches the difference between *point contact* and *line contact* of antifriction bearings.

Name the type of bearing it applies to below each sketch. (2 + 2) (4)

1.4 Give ONE function of a bearing seal. (1)

[13]

QUESTION 2: COUPLINGS

2.1 Explain the function of a coupling. (1)

2.2 Make neat sketches to illustrate the following types of coupling misalignment:

2.2.1 Parallel (radial)

2.2.2 Angular (face)

2.2.3 Gap (axial)

(3 × 1) (3)

2.3 List any FOUR common faults associated with the use of couplings. (4)

2.4 Explain *motor rock* (or *soft foot*) encountered with electric motors and how it should be corrected before the shafts are aligned and the coupling refitted. (2)

[10]

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QUESTION 3: BRAKES AND CLUTCHES

3.1 Explain the working principle of an electromagnetic brake. (2)

3.2 List THREE brake defects. (3)

3.3 FIGURE 1 below shows a sectional view of a single-disc clutch assembly.

Label the figure by writing only the name of each part next to the number (1–5) in the ANSWER BOOK.

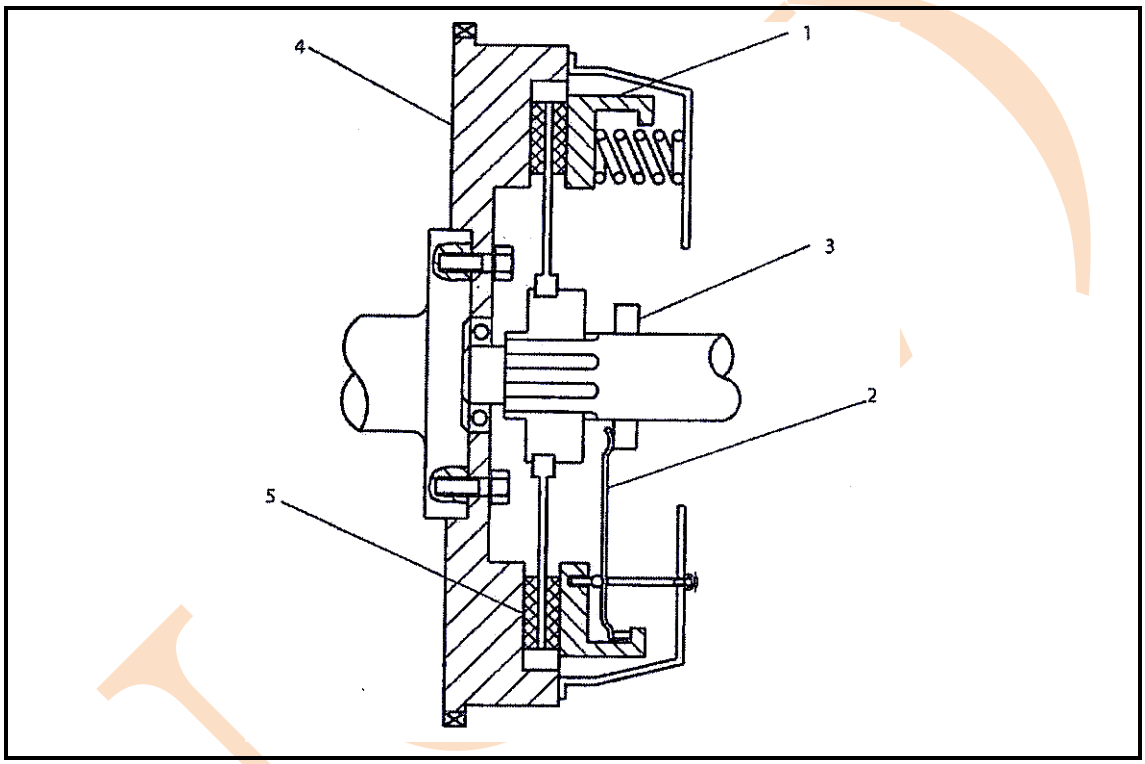

FIGURE 1 (5)
[10]

QUESTION 4: BELT DRIVES, CHAIN DRIVES AND GEAR DRIVES

4.1 Define the following terms with regard to V-belt drives:

4.1.1 Drive pulley

4.1.2 Driven pulley

4.1.3 Idler pulley

4.1.4 Arc of contact

4.1.5 Centre distance

(5 × 1) (5)

4.2 Name THREE types of chain sprockets. (3)

4.3 Explain with the aid of a neat sketch how a drip lubrication system works on a chain drive. (2)

4.4 Copy the table below in the ANSWER BOOK. Give THREE advantages and TWO disadvantages of gear drives when compared to chain drives.

ADVANTAGES	DISADVANTAGES

(3 + 2) (5)

4.5 What could cause the following faults if a quality check is done on a newly assembled gearbox:

4.5.1 The unit overheats

4.5.2 An oil leak at the breather

(2 × 1) (2)

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QUESTION 5: PIPES, PIPE FITTINGS AND VALVES

5.1 FIGURE 2 below shows different pipe dimensions.

Label the figure by writing only the correct name of each dimension next to the letter (A–D) in the ANSWER BOOK.

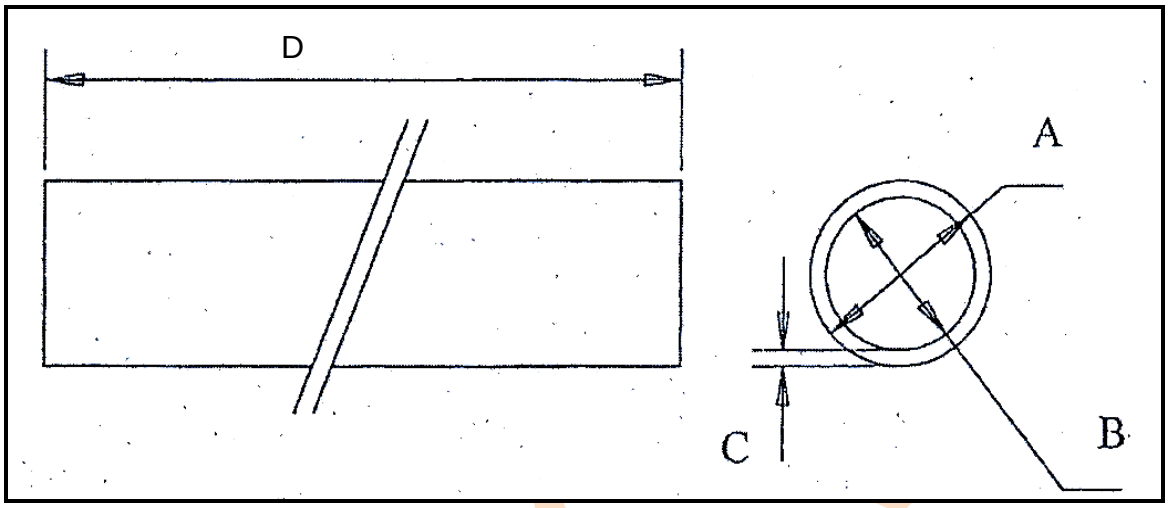

FIGURE 2 (4)

5.2 Name the pipe fitting used to:

5.2.1 Split a single parallel-pipe fluid supply into a double-pipe fluid supply

5.2.2 Close the end of a pipe to stop fluid supply

(2 × 1) (2)

5.3 Name FOUR types of valves. (4)
[10]

QUESTION 6: CENTRE LATHE

6.1 State FIVE lathe operation hazards one can encounter when working on a lathe. (5)

6.2 The cutting speed for cutting cast iron is 30 m/min.

Calculate the rotational speed of the spindle (in r/min) when turning a bar of 60 mm in diameter.

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

6.3 You are required to set a cutting tool at centre height before turning a workpiece on a lathe.

Explain in FIVE steps how to achieve this operation. (5)

6.4 Copy the table below in the ANSWER BOOK. Give TWO advantages and THREE disadvantages of a three-jaw chuck.

ADVANTAGES	DISADVANTAGES

(2 + 3) (5)

6.5 Explain the purpose of flooding the cutting tool and workpiece with coolant during a cutting operation on the lathe. (2)

[20]

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QUESTION 7: MILLING MACHINE

7.1 John is preparing the milling machine for operation.

List the FOUR steps he should follow. (4)

7.2 State FIVE factors to consider when clamping a workpiece ensuring that it is properly mounted and supported. (5)

7.3 Rapid indexing must be done to cut eight evenly spaced holes around the circumference of a shaft.

Calculate the indexing required if an index plate with 24 holes is mounted to the dividing head. (2)

7.4 A milling cutter is 12 mm in diameter and has two teeth. The cutting speed for the material is given as 25 m/min with a feed of 0,18 mm per tooth.

Calculate the feed in mm/min.

(HINT: $S = \pi \times D \times N$ and $f = f_t \times T \times N$) (6)

7.5 A workpiece must be machined to a tolerance of ±0,02 mm.

Explain this statement. (2)

7.6 Complete the following sentence by writing only the missing words next to the question number (7.6) in the ANSWER BOOK.

A rough-sounding spindle during milling machine operation is normally a sign of … (1)

[20]

TOTAL: 100

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