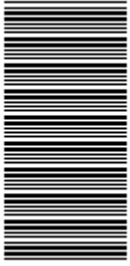


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**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

**MACHINE MANUFACTURING
NQF LEVEL 3**

NOVEMBER EXAMINATION

(6030203)

**18 November 2013 (X-Paper)
09:00 – 12:00**

This question paper consists of 8 pages.

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
 2. Read ALL the questions carefully.
 3. Subsections of questions may NOT be separated.
 4. Number the answers according to the numbering system used in this question paper.
 5. Sketches must be neat.
 6. Write neatly and legibly.
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QUESTION 1

- 1.1 The following is the list of centre lathe parts found in a fitting and turning workshop. Rearrange the parts and make a free-hand sketch showing turning between the centre's operations.

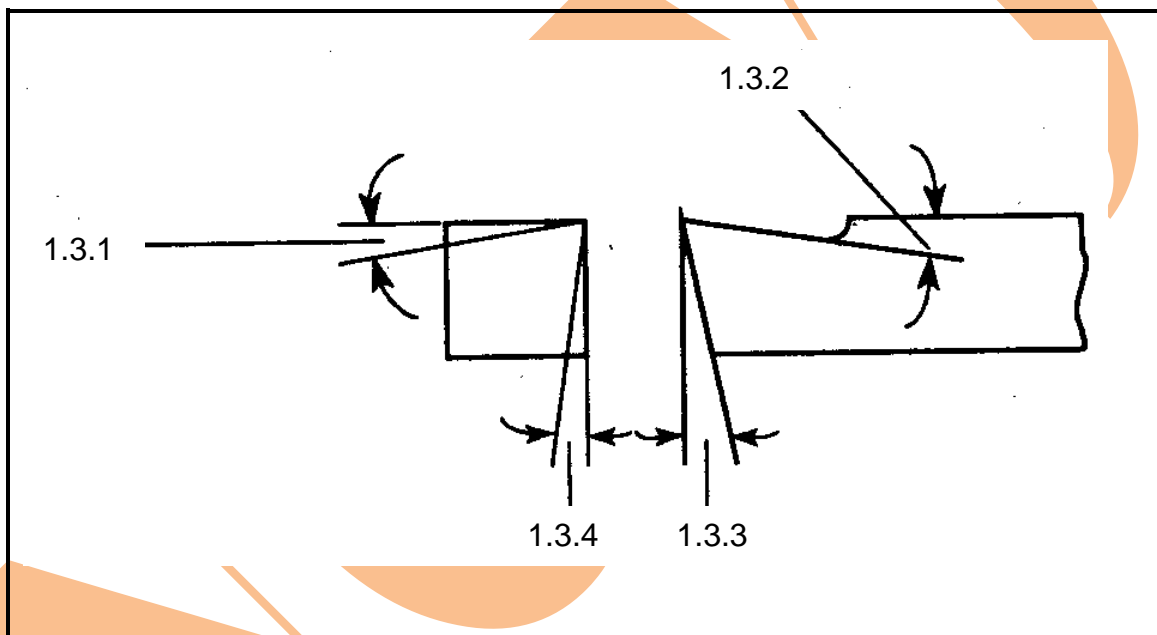
tailstock; work piece; driving plate; carrier or dog; driving pin; dead centre; live centre

(6)

- 1.2 State FIVE advantages of CAD applications.

(5)

- 1.3 FIGURE 1 below, shows a cutting tool. Name the different angles of the tool numbered (1.3.1–1.3.4) in the ANSWER BOOK.

**FIGURE 1**

(4)

- 1.4 Pedestal drilling machines use different methods of selecting speed and feeds.

Briefly explain the differences how to select a spindle speed for a sensitive pedestal drilling machine and a radial arm drilling machine.

(4)

- 1.5 Briefly explain how the following steadies are mounted on the centre lathe during turning operation.

1.5.1 Fixed steady

(2)

1.5.2 Travelling steady

(2)

- 1.6 The bush and the shaft have to be machined according to the given dimensions as shown in FIGURE 2 below.

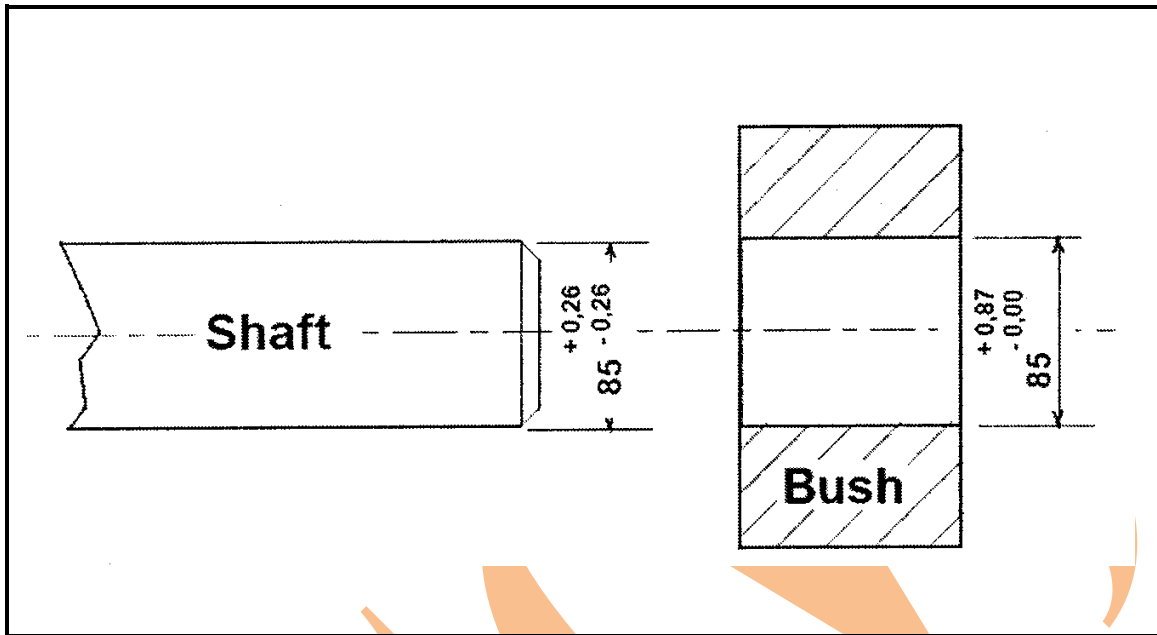


FIGURE 2

- 1.6.1 Determine the maximum allowance of the fitted parts. (1)
- 1.6.2 Determine the tolerance of the shaft. (1)
- [25]**

QUESTION 2

- 2.1 Calculate the feed in millimeters per minute of a 70 mm diameter cutter with 12 teeth operating at a cutting speed of 25 m/minute and a feed rate of 0,08 per tooth. (4)
- 2.2 Illustrate the following common machine symbols using freehand drawings:
- 2.2.1 Chamfer
 - 2.2.2 Tapping threaded hole
 - 2.2.3 Spot facing
 - 2.2.4 Reaming
 - 2.2.5 Countersinking

(5 × 1) (5)

2.3 An apprentice is required to machine an engine casting and bore FOUR 12 mm diameter counter-bore cap screw holes.

2.3.1 Make a neat sectional drawing showing how the cap-head screw fits into the counter-bore cap screw holes. (2)

2.3.2 Name the TWO main machine tools you would need to counter-bore the holes in the engine castings. (2)

2.4 During the drilling operation you break the drill bit. Give TWO possible reasons as to why the drill bit broke and suggest TWO corrective measures to prevent this problem happening again. (4)

2.5 FIGURE 3 below, shows a work piece mounted on a centre lathe with a steady.

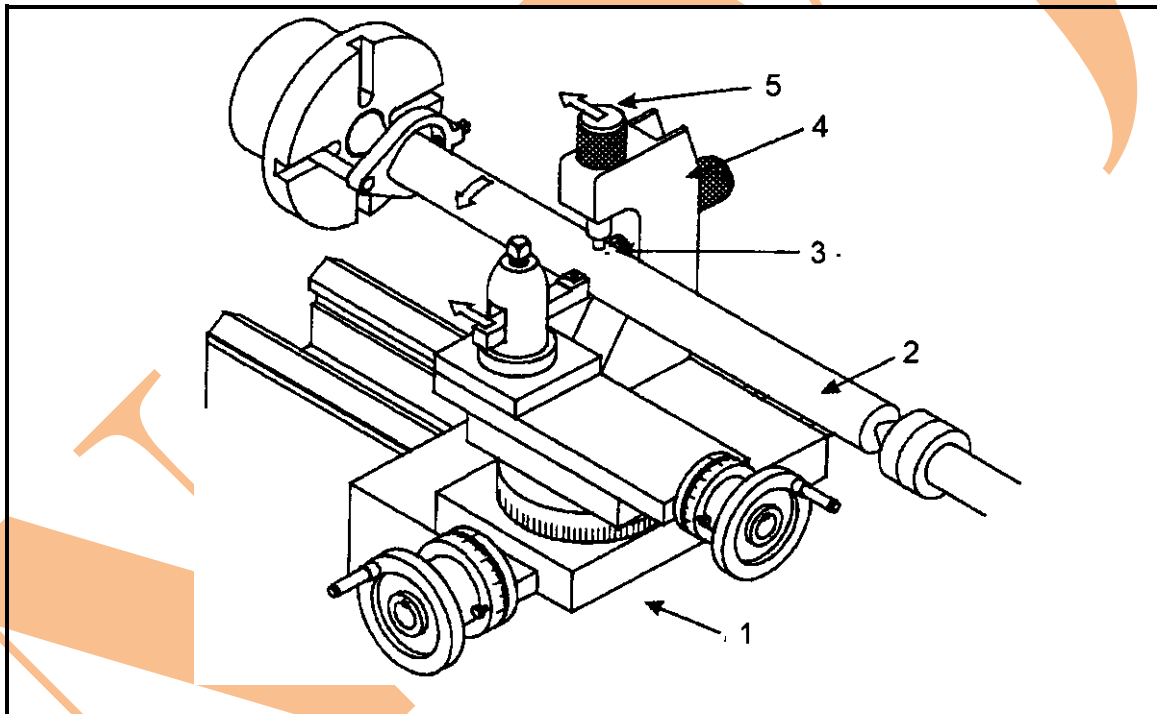


FIGURE 3

2.5 2.5.1 Which type of method is used to hold this work piece (1)

2.5.2 Which type of steady is used to machine this work piece (1)

2.5.3 Label the components numbered (1–5) in the ANSWER BOOK. (5)

2.6 State the function of each of the following milling machine cutting tools.

2.6.1 T- slot cutter

2.6.2 Dovetail cutter

2.6.3 Ball nose cutter

2.6.4 Roughing milling cutter

2.6.5 End mill cutter

(5 × 1) (5)

2.7 Describe the following milling operations.

2.7.1 Gang milling

2.7.2 Straddle milling

(2 × 2) (4)

2.8 A mild-steel shaft is machined on the centre lathe between centre's as shown in FIGURE 4 below. Label the parts of the cutting tool lettered (A–C) in the ANSWER BOOK.

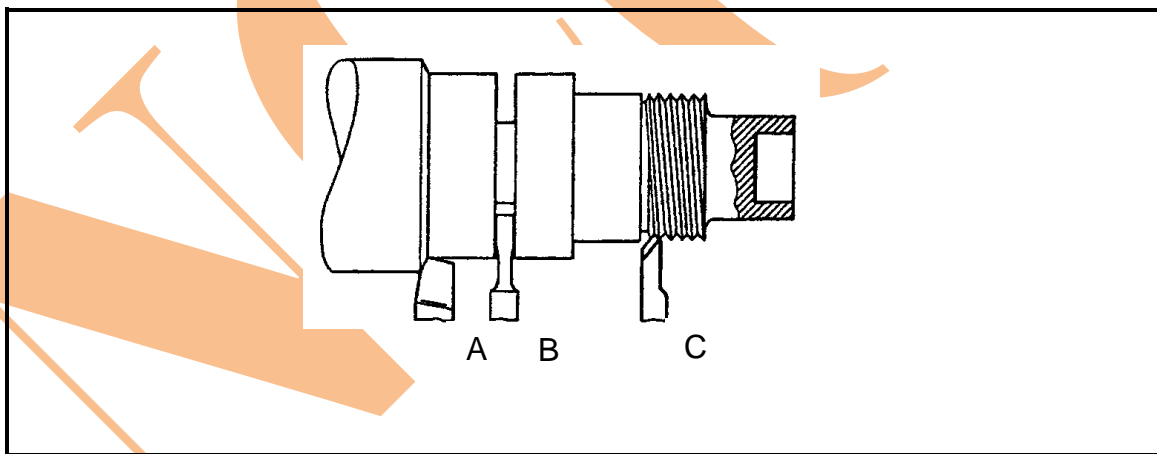


FIGURE 4

(3)

2.9 Name FOUR types of indexing methods that are used on a milling machine

(4)
[40]

QUESTION 3

3.1 The carriage is the assembly of various parts of the lathe that can be traversed along its bed. FIGURE 5 below shows some of these components.

Label the parts numbered (3.1.1–3.1.5) in the ANSWER BOOK.

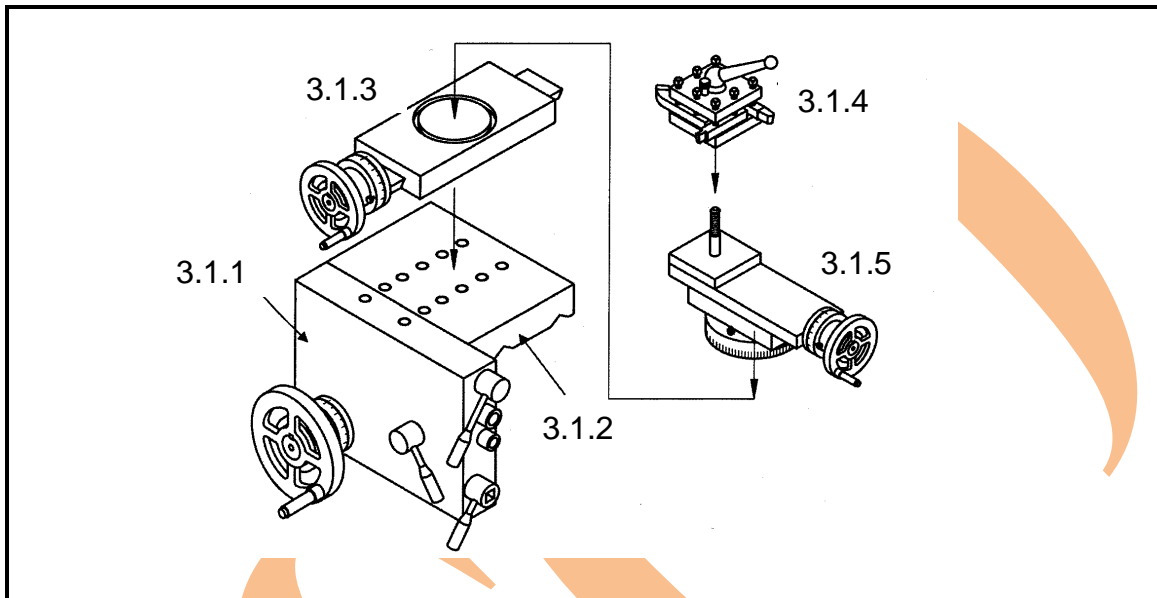


FIGURE 5

(5)

3.2 A four-jaw chuck consists of characteristics regarding the advantages and disadvantages.

3.2.1 State TWO disadvantages of a four-jaw chuck.

(2)

3.2.2 State TWO advantages of a four-jaw chuck.

(2)

3.2.3 What pre-operational check need to be done before operating a milling machine?

(1)

3.3 Determine the spindle speed (in revolutions per minute) a milling machine must be set, using a 100 mm diameter cutter to machine a work piece, if the required cutting speed is 29 metres per minute.

(4)

3.4 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (3.4.1–3.4.5) in the ANSWER BOOK.

3.4.1 A travelling steady is fitted to the carriage and should travel along with tool supporting the work piece.

3.4.2 Taper-turning is cylindrical in shape.

3.4.3 One use of a centre lathe is to cut screws.

3.4.4 The centre lathe needs no attention when operating because it can run by itself.

3.4.5 Dial test indicator (DTI) method support the work piece during cutting.
(5 × 1) (5)

3.5 Name FOUR machining processes that can be performed on a milling machine. (4)

3.6 While grinding a plate on the surface grinder you experience the following problem:

Scratch marks on the work piece.

3.6.1 Name ONE cause of the problem.

3.6.2 Name ONE solution to the problem.
(2 × 1) (2)

3.7 Explain the difference between the following terms:

3.7.1 Dressing a grinding wheel

3.7.2 Truing a grinding wheel

(2 × 1) (2)

3.8 State TWO advantages and TWO disadvantages of a work piece being held between centre's. (4)

3.9 Refer to FIGURE 6 below and identify the lathe centre's. Write the answer next to the letter (A–D) in the ANSWER BOOK.

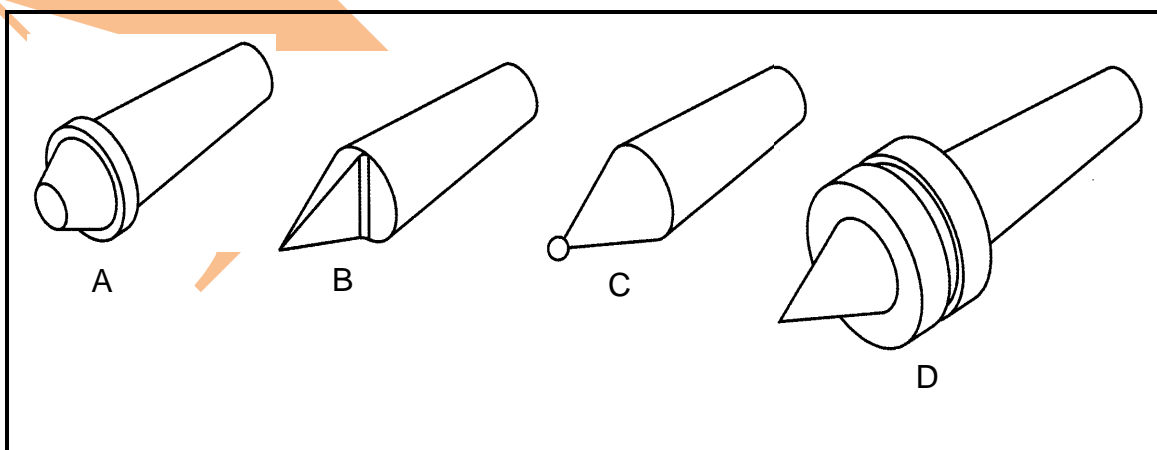


FIGURE 6

(4)
[35]

TOTAL: 100