



# higher education & training

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Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL CERTIFICATE (VOCATIONAL)**

**MACHINE MANUFACTURING  
NQF LEVEL 3**

(6030203)

**28 February 2024 (X-paper)  
09:00–12:00**

**This question paper consists of 9 pages.**

285Q1S2428



**DEPARTMENT OF HIGHER EDUCATION AND TRAINING**  
**REPUBLIC OF SOUTH AFRICA**  
NATIONAL CERTIFICATE (VOCATIONAL)  
MACHINE MANUFACTURING  
NQF LEVEL 3  
TIME: 3 HOURS  
MARKS: 100

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**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 question on a new page.
  5. Use only a black or blue pen.
  6. Write neatly and legibly.
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**QUESTION 1**

- 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 Two people can operate a lathe machine.
- 1.1.2 It is safe to reach over a rotating chuck on a lathe machine.
- 1.1.3 It is the artisan's responsibility to check whether a machine is in a safe working condition.
-  1.1.4 No person should work alone on a machine in a workshop.
- 1.1.5 A fixed guard that covers rotating pulleys is painted dark brown. (5 × 1) (5)
- 1.2 Demarcation lines are important in a workshop to avoid accidents.  
What other things in a workshop can be indicated by demarcation lines? (4)
- 1.3 A trainee is working on a centre lathe. He is wearing loose clothes.  
Use a formula to perform a machine risk assessment of this workshop situation by means of a rating scale. (3)
- 1.4 What is the difference between a *minor*, *major* and *very serious accident*? Give an example of each. (3)

**[15]****QUESTION 2**

- 2.2 Explain each of the following terms:
- 2.2.1 Interference fit (2)
- 2.2.2 Running fit (1)
- 2.2.3 Push fit (1)
-  2.2.4 Driving fit (1)

2.3 The size of a workpiece is given as  $150^{+0,03}_{-0,03}$ .



Determine each of the following:

2.3.1 Upper limit (1)

2.3.2 Lower limit (1)

2.3.3 Tolerance (2)

2.4 Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A–D) next to the question number (2.4.1–2.4.4) in the ANSWER BOOK.



COLUMN A		COLUMN B	
2.4.1	Parallel lay	A	
2.4.2	Perpendicular lay	B	
2.4.3	Circular lay	C	
2.4.4	Radial lay	D	

(4 × 1) (4)

2.5 Draw the symbol of each of the following surfaces of materials:



2.5.1 Burnished

2.5.2 Tinned

(2 × 1) (2)

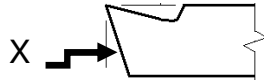
[15]



**QUESTION 3**

3.1 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 (3.1.1–3.1.4) in the ANSWER BOOK. ★

3.1.1 The following sketch shows an angle of a lathe cutting tool.

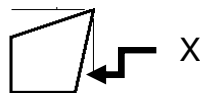


Identify the angle at X:

- A Top rake
- B Side clearance
- C Side rake
- D Front clearance



3.1.2 The following sketch shows an angle of a lathe cutting tool.

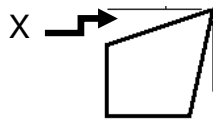


Identify the angle at X:

- A Side clearance
- B Top rake
- C Side rake
- D Front clearance



3.1.3 The following sketch shows an angle of a lathe cutting tool.

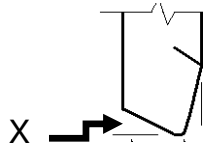


Identify the angle at X:

- A Side clearance
- B Top rake
- C Side rake
- D Front clearance



3.1.4 The following sketch shows an angle of a lathe cutting tool.



Identify the angle at X:

- A End-cutting edge angle
- B Side-cutting edge angle
- C Front clearance
- D Top rake

(4 × 1) (4)

3.2 What is the purpose of a drill grinding gauge? (2)

3.3 Draw a sketch to illustrate a block being clamped using an angle plate. (4)

3.4 A 40 mm diameter cutter is used on a milling machine.



Calculate the r/min cutting speed 70 m/min.

(5)  
[15]

**QUESTION 4**

4.1 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–E) next to the question number (4.1.1–4.1.4) in the ANSWER BOOK.



COLUMN A		COLUMN B	
4.1.1	Housing situated on the left side of the lathe machine that contains the gears	A	tailstock
4.1.2	The drill chuck or a centre fits in a ...	B	carriage
4.1.3	What is an assembly of various parts on a lathe that can be traversed along the bed?	C	headstock
4.1.4	The compound slide is screwed onto the ...	D	saddle
		E	top slide

(4 × 1) (4)



4.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (4.2.1–4.2.4) in the ANSWER BOOK.



4.2.1 A four-jaw chuck has three independent jaws.

4.2.2 A faceplate does not need to be balanced with counterweights when an irregular shaped workpiece is clamped.

4.2.3 There are various types of mandrels.

4.2.4 A hexagon bar can be clamped in a three-jaw chuck.

(4 × 1)

(4)

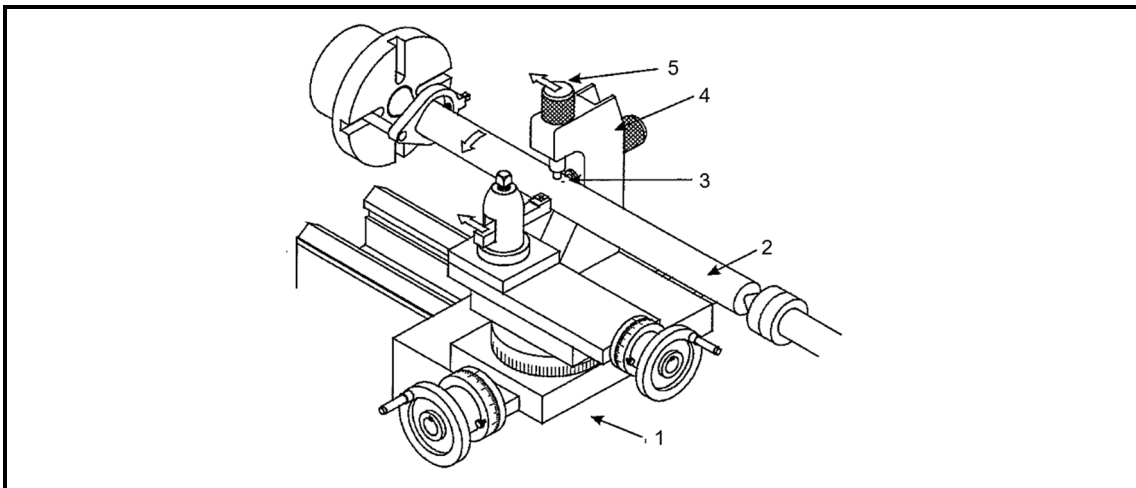


4.3 Show, by means of a sketch, the difference between a *half centre* and a *pipe centre*.

(2 + 2)

(4)

4.4



**FIGURE 1**

Identify the components of the travelling steady shown in FIGURE 1 by writing only the answer next to the number (1–5) in the ANSWER BOOK.

(5 × 1)

(5)

4.5 Name THREE types of milling machines.

(3)

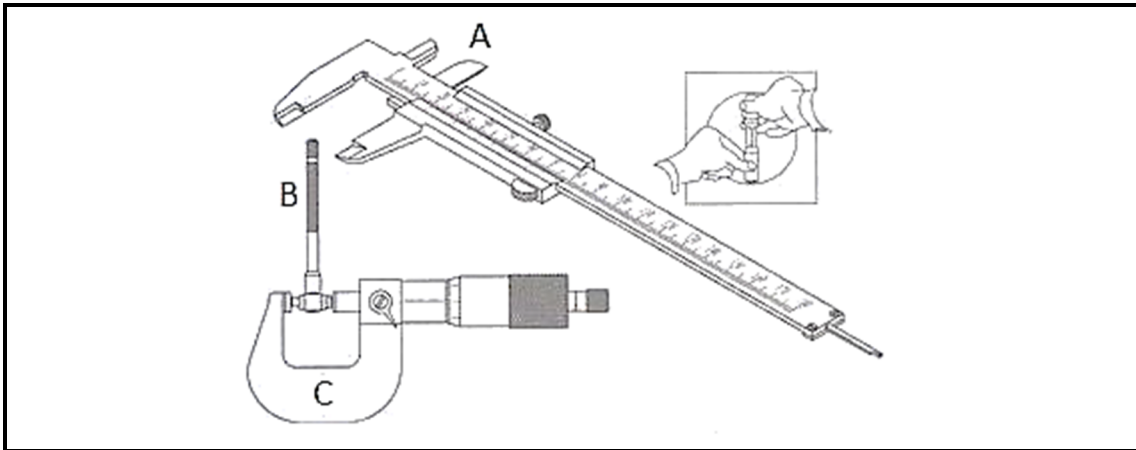
4.6 You are required to machine two grooves on a shaft by using a milling machine. The grooves are separated at an angle of 35°. Use the Cincinnati dividing head to calculate the indexing required, turning the workpiece at the required angle.



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

(5)

4.7 FIGURE 2 shows three precision-measuring instruments.



**FIGURE 2**



Name the three precision-measuring instruments by writing only the answer next to the letter (A–C) in the ANSWER BOOK. (3 × 1)

(3)

4.8 Complete the following paragraph by choosing a word or words from the list below and writing it next to the question number (4.8.1–4.8.4) in the ANSWER BOOK.

cutting tool; clamped; vice; dividing heads; milling



On a milling machine the workpiece that is to be shaped is (4.8.1) ... to the table of the (4.8.2) ... machine; either directly or by means of a (4.8.3) ... and other fixtures namely (4.8.4) ... (4 × 1)

(4)

4.9 Show, by means of a simple sketch, the difference between a *T-slot cutter* and a *dovetail cutter*. (2 + 2)

(4)

4.10 Compare a milling machine to a lathe by explaining the FOUR types of operations that can be done on both. (4)

(4)



**[40]**



**QUESTION 5**

5.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (5.1.1–5.1.6) in the ANSWER BOOK.



5.1.1 The *Ellipse* command can also be used to draw a circle.

5.1.2 The *Polygon* command can draw up to ten sides.

5.1.3 The *Hatch* command is used for sectional views.

5.1.4 Selecting a line and then clicking the *Erase* icon will delete the line.



5.1.5 Different line weights are important in a drawing.

5.1.6 The *Copy* command cannot duplicate a drawing.

(6 × 1) (6)

5.2 Give FOUR disadvantages of running a CAD in the industry. (4)

5.3 Give the FIVE steps to produce a CAD drawing. (5)

**[15]**

**TOTAL: 100**

