higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MACHINE MANUFACTURING
NQF LEVEL 3

(6030203)

19 November 2019 (X-Paper)
09:00–12:00

This question paper consists of 9 pages.

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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.   ALL drawings must be neat and well balanced.

5.   Write neatly and legibly.

QUESTION 1

1.1 Name FIVE safety precautions one needs to observe while mounting a grinding wheel on a pedestal grinder. (5)

1.2 When operating a centre lathe, occupational health and safety rules need to be adhere to. In FIGURE 1 below, identify TWO unsafe acts that the operator is guilty of NOT following. (2)

FIGURE 1

1.3 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–C) next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

1.3.1 A centre lathe is used for …

A cutting wires.
B cutting triangle-shaped structures.
C machine tapers on shafts.

1.3.2 Speed and gear changes on a pedestal-sensitive drilling machine is regulated by the …

A gearbox.
B pulley and v-belt.
C rack and pinion.

1.3.3 Taper turning on a centre lathe is known as …

A tailstock set-over method.
B Cincinnati dividing head.
C simple indexing.

1.3.4   The function of cutting fluid is to …

   A   cut the work piece.
   B   be absorbed by the work piece.
   C   minimise the effect of heat and friction on the work piece.

1.3.5   To remove a taper-shank drill bit from the spindle of a drilling machine, we use a …

   A   drift.
   B   Morse taper drill bit.
   C   2–3 sleeve.

                                                            (5 × 1)   (5)

1.4   By means of free-hand sketch, show the difference between the three drilling processes that can be performed on a drilling machine in the workshop.   (3)
                                                                        [15]

QUESTION 2

2.1   Refer to TABLE 1 and choose an item from COLUMN B that matches a description in COLUMN A. Write only a letter (A–F) next to the question number (2.1.1–2.1.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1.1	A measuring instrument used in conjunction with an outside micrometer	A	countersink
2.1.2	No person is allowed to leave his/her post while operating a machine	B	safety rule
		C	ring test
2.1.3	Use the right tool for the right job	D	OHS Act (85 of 1993)
2.1.4	Tap the grinding wheel gently with a non-metal tool	E	telescopic gauge
2.1.5	To remove material from top of hole to make screws flush	F	boring bar

                                                            (5 × 1)   (5)

2.2   Name the TWO groups into which machine guards are classified and give ONE example of each.   (2 × 2)   (4)

2.3   Give ONE reason why machine guards are so important.   (1)

2.4   Complete the following sentences by filling in the missing word or words. Write only the word or words next to the question number (2.4.1–2.4.4) in the ANSWER BOOK.

     2.4.1   A storage device is a hard disk … permanently inside your computer.   (1)

     2.4.2   An AUTOSNAP command enables the automatic placing of an object without having to … ONSNAP.   (1)

     2.4.3   RETURN BUTTON is the … button of the keyboard.   (1)

     2.4.4   Before starting your CAD drawing, you should … how you are going to make use of the …   (2)

[15]

QUESTION 3

3.1   FIGURE 2 below shows a limit system known as a hole basis system. Categorise the types of fits shown in FIGURES 3.1.1 to 3.1.3 below.
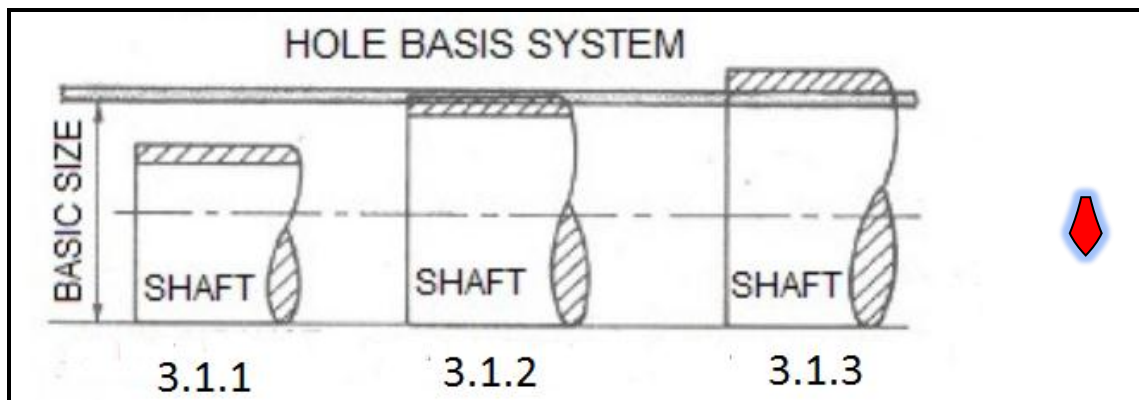

FIGURE 2   (3)

3.2   Describe the shaft basis system in terms of fits and limits.   (2)

3.3   A precision fit between a bearing and a shaft is given as 150 H8 – g6.

    What is meant by the following symbols:

     3.3.1   The value – 150.

     3.3.2   Capital letter – H.

     3.3.3   Number – 8.

     3.3.4   Small letter – g.

     3.3.5   Number – 6.

(5 × 1)   (5)

3.4 Given the bilateral tolerance of (100±0,01 mm).

Determine the following fits and limits indicated below.

3.4.1 Basic size

3.4.2 Upper limit

3.4.3 Lower limit

(3 × 1) (3)

3.5 Explain the difference between the *allowance* and *tolerance* in fits and limits. (2)

[15]

QUESTION 4

4.1 FIGURE 3 below shows a very important machine in the machining workshop.

4.1.1 Name the machine in FIGURE 3 and state what it is used for. (2)

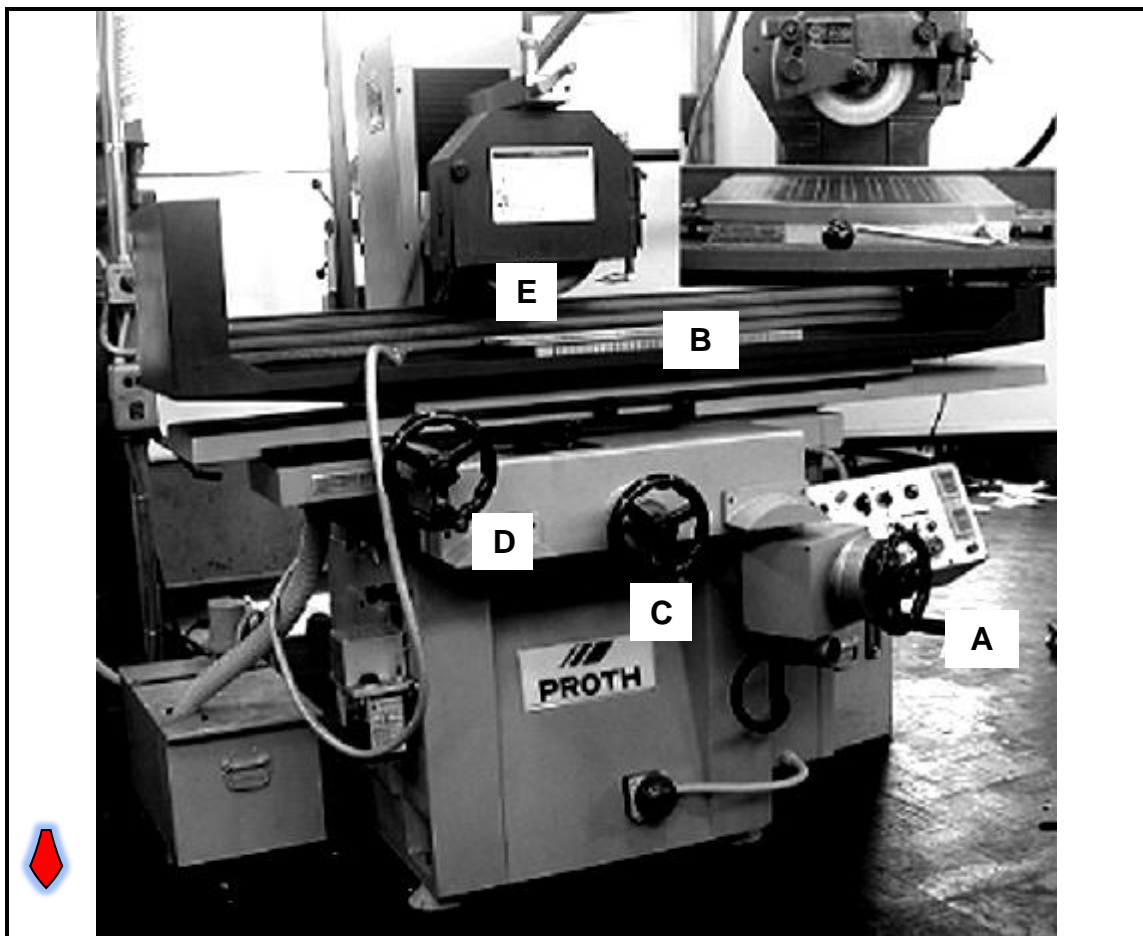4.1.2 Identify the components marked (A–E) in FIGURE 3. (5)

FIGURE 3

Please turn over

4.2 FIGURE 4 shows a machining process that can be performed on a centre lathe.
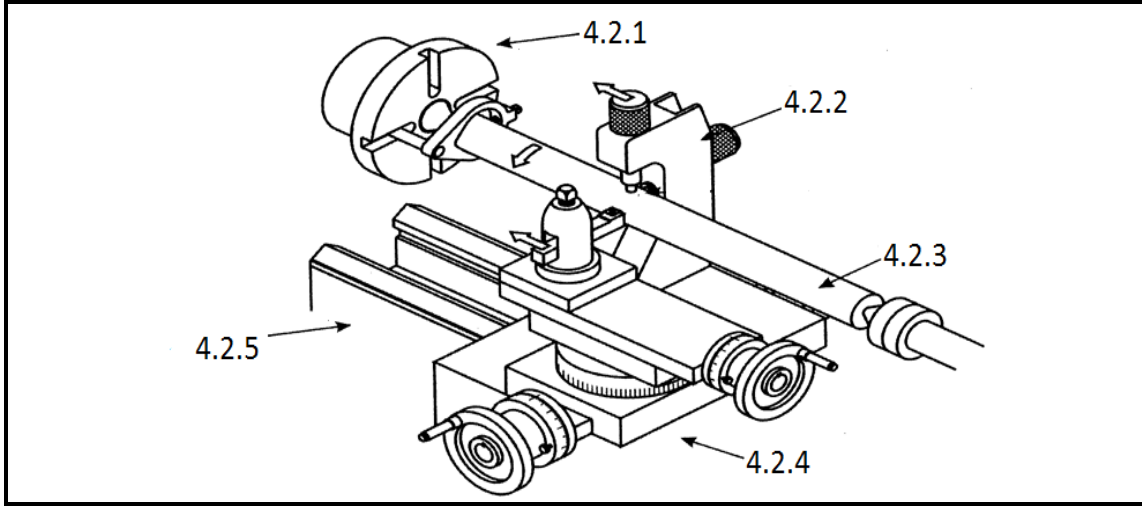
Identify the components marked (4.2.1–4.2.5) in FIGURE 3.

FIGURE 4 (5)

4.3 Name FIVE machining processes that can be performed on the machine shown in FIGURE 4. (5)

4.4 Identify the milling machine cutting tools in FIGURE 5.

FIGURE 5 (3)

[20]

QUESTION 5

5.1   Label the components marked (5.1.1–5.1.4) in FIGURE 6 and write them in the ANSWER BOOK.
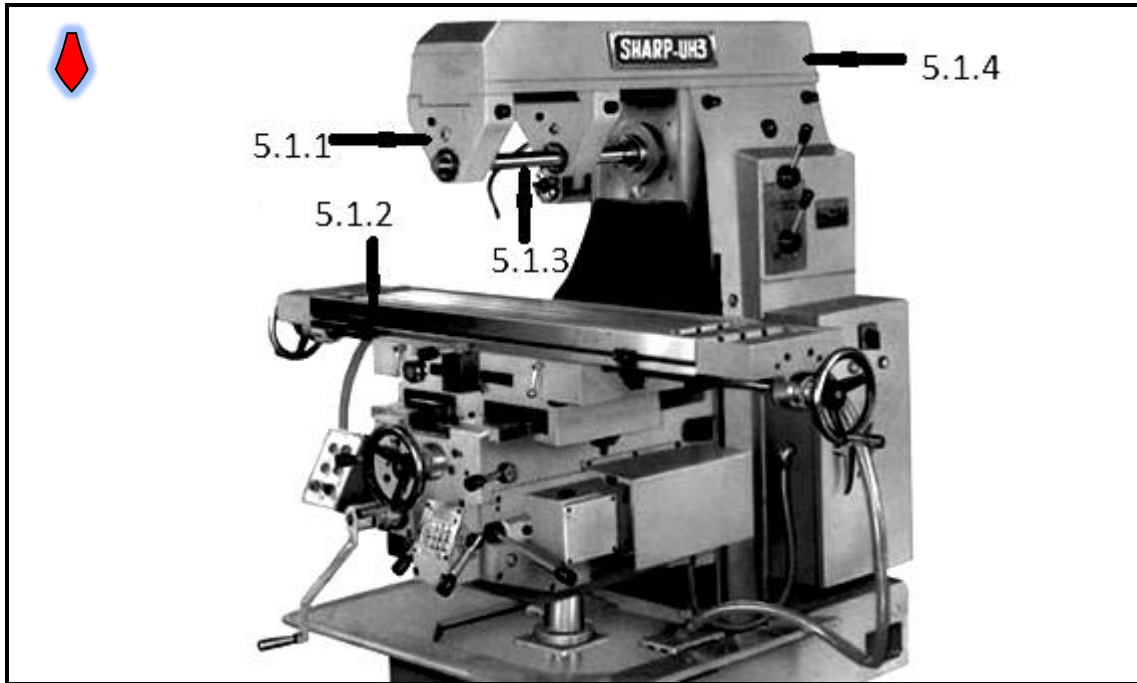

FIGURE 6   (4)

5.2   Identify the type of milling machine shown in FIGURE 6 above.   (1)

5.3   As a turner machinist you are being tasked to machine a square thread. When you get to the machine, there is NO chuck in the spindle of the machine. Instead, chuck jaws and a chuck key lie on top of the work bench.

Develop FIVE steps that you will follow in order to set up the machine to be ready for the machining process of screw cutting.   (5)

5.4   Different machining processes can be performed on milling machine.

Identify FIVE machining processes that this machine can perform.   (5)

5.5   Calculate the required indexing for a gear with 44 teeth, using a Brown and Sharpe dividing head.

Side 1	15	16	17	18	19	20						
Side 2	21	23	27	29	31	33						

BROWN AND SHARPE   (5)

5.6   A shaft 40 mm in diameter and 250 mm long must be turned on a centre lathe. The cutting speed for the material is 25 m/minute.

Calculate the time required to take one cut over the length of the shaft with a feed rate of 0,5 mm/r. Give your answer in minutes and seconds.   (5)

5.7   FIGURE 7 below shows a certain type of milling machine.

5.7.1   What type of milling machine is shown in FIGURE 7?   (1)

5.7.2   Name any TWO machining processes that can be performed with the type of milling machine shown in FIGURE 7.   (2)

5.7.3   Identify the seven components shown on the milling machine in FIGURE 7.

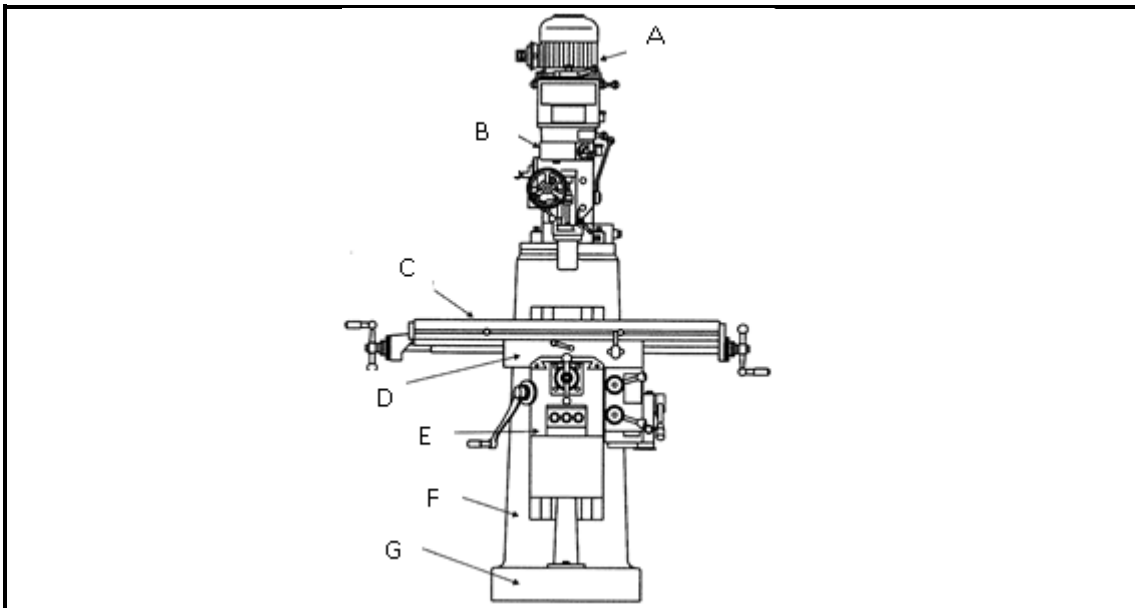**NOTE:** Write down only the letter (A–G) and the correct answer in the ANSWER BOOK.   (7)

FIGURE 7

[35]

TOTAL   100