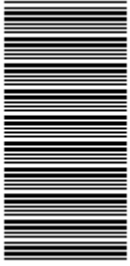


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**higher education  
& training**

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

**NATIONAL CERTIFICATE (VOCATIONAL)**

**MACHINE MANUFACTURING  
NQF LEVEL 3**

**SUPPLEMENTARY EXAMINATION**

(6030203)

**3 March 2014 (X-Paper)  
09:00–12:00**

**This question paper consists of 8 pages.**

**TIME: 3 HOURS  
MARKS: 100**

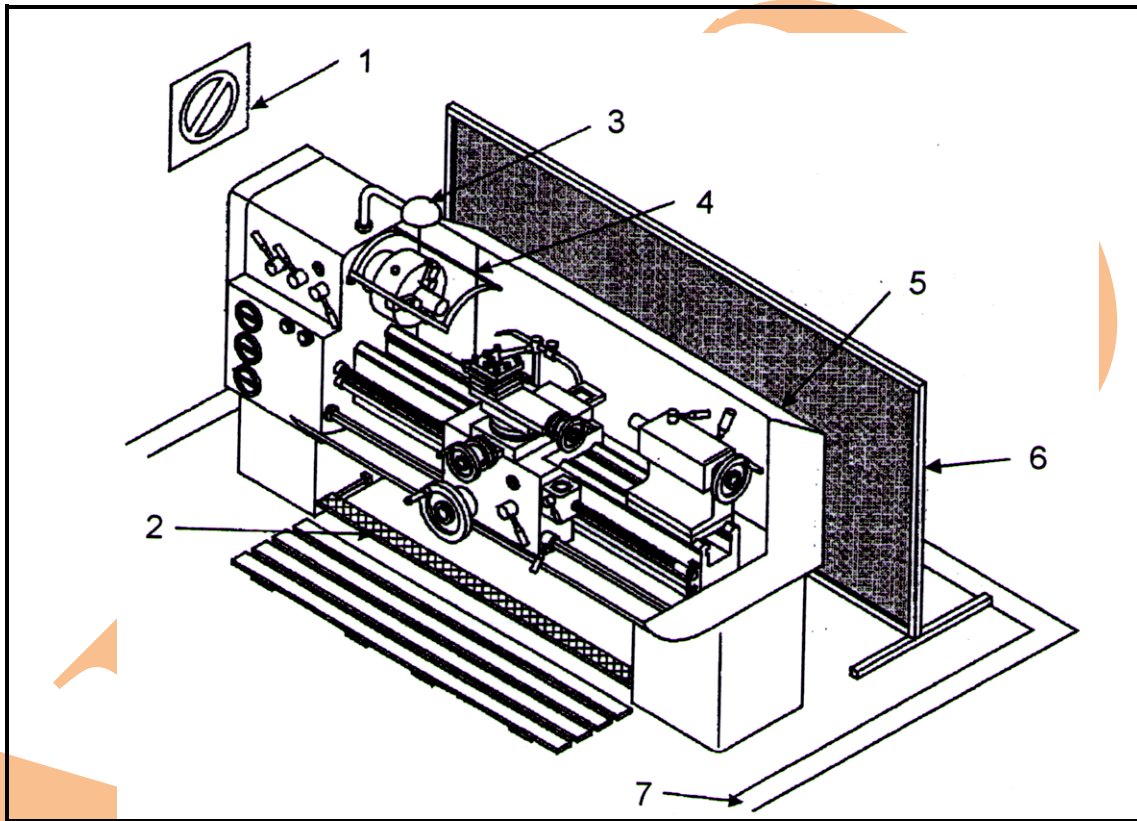
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**INSTRUCTIONS AND INFORMATION**

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. Subsections of questions may NOT be separated.
  5. Sketches must be neat.
  6. Write neatly and legibly.
-

**QUESTION 1**

- 1.1 What is meant by good housekeeping when working with machines? (1)
- 1.2 Name TWO safety hazards around machinery and equipment. (2)
- 1.3 FIGURE 1 below shows the diagram of a lathe. Label the safety features numbered (1–7) in the ANSWER BOOK.



**FIGURE 1**

- (7)
- 1.4 Develop a FIVE steps procedure to produce a CAD drawing. (5)
- 1.5 State THREE simple steps of risk assessment as required by Occupational Health Safety Act from the employers. (3)
- 1.6 Explain the following CAD commands
  - 1.6.1 Line command
  - 1.6.2 Trim
  - 1.6.3 Construction line

(3 x 1) (3)

1.7 Distinguish between *horizontal milling machine* and the *Colchester-centre lathe* in terms of the following:

- 1.7.1 Clamping of the work piece
- 1.7.2 Cutting tools
- 1.7.3 Emergency stop

(3 × 2) (6)  
[27]

**QUESTION 2**

2.1 Indicate in TABULAR form whether the following are INPUT or OUTPUT devices that are used in engineering application:

digital camera; printers; plotters; scanners; keyboards; screen; microphone

(7)

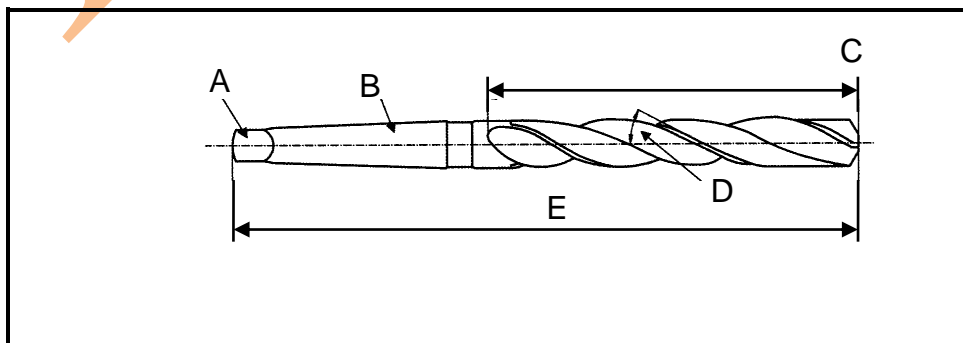
2.2 A turner machinist is required to machine and grind a shaft with the following size:  $120,00^{\pm 0.03}$

Determine the following:

- 2.2.1 Upper limit
- 2.2.2 Tolerance
- 2.2.3 Lower deviation
- 2.2.4 Lower limit
- 2.2.5 Basic size

(5 × 1) (5)

2.3 FIGURE 2 below, shows a taper-shank drill bit. Label the components (A–E) in the ANSWER BOOK.



**FIGURE 2** (5 × 1) (5)

- 2.4 Different turning operations can be performed on the lathe. FIGURE 3(a) and FIGURE 3(b) below, shows two operations.

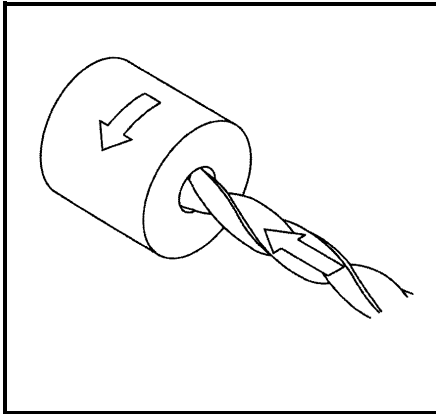


FIGURE 3(a)

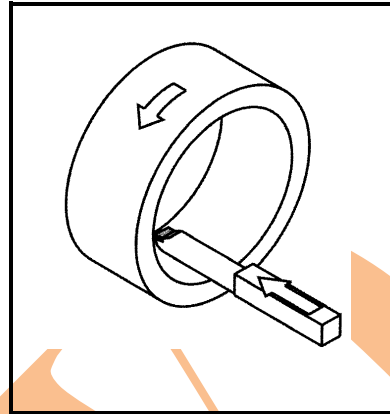


FIGURE 3(b)

- 2.4 2.4.1 Identify the TWO machining operations in FIGURE 3(a) and 3(b). (2)
- 2.4.2 How do you go about performing each operation identified in QUESTION 2.4.1? (4)
- 2.5 By means of a free-hand sketch distinguish between a *dotting punch* and a *centre punch*. (2)
- [25]

### QUESTION 3

- 3.1 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 (3.1.1–3.1.4) in the ANSWER BOOK.
- 3.1.1 What machine would you use to machine a groove for the feather key on a shaft?
- A Milling machine  
B Drilling machine  
C Surface grinding machine
- 3.1.2 Which milling cutter would you use to machine a key-way?
- A Drill bit  
B Plain helical cutter  
C Slot drill
- 3.1.3 When cutting off a length of a round bar on a centre lathe, you would use a ...
- A hacksaw.  
B parting-off tool.  
C boring bar.

- 3.1.4 To machine sides of a hexagon nut on a milling machine you will require the following attachment:
- A Dividing head
  - B Arbor support
  - C Steady
- (4 × 1) (4)
- 3.2 State TWO advantages of a four-jaw chuck (2)
- 3.3 You have a job instruction sheet to do machining on a milling machine.  
List FIVE basic steps of operation to be followed to complete the job. Highlight only the key issues. (5)
- 3.4 Make use of a freehand drawing to illustrate the operation of a parting off-tool.  
Show also the direction of the parting tool and the hand feed. (3)
- 3.5 On a milling machine there are pre-operational checks that should be carried out.  
State FOUR pre-operational checks that one must do before using a milling machine. (4)
- 3.6 A milling-machine cutter with a diameter of 100 mm has 14 teeth.  
The cutting speed for the material is given at 24 m/min and the feed rate per tooth is 0,051 mm.  
Calculate the rotational frequency and the feed rate. (4)
- 3.7 State THREE advantages of using cutting fluid during machining processes. (3)
- 3.8 Distinguish between the *milling machine* and the *centre lathe* by identifying THREE machining processes that can be performed in both machines. (3)
- [28]**

**QUESTION 4**

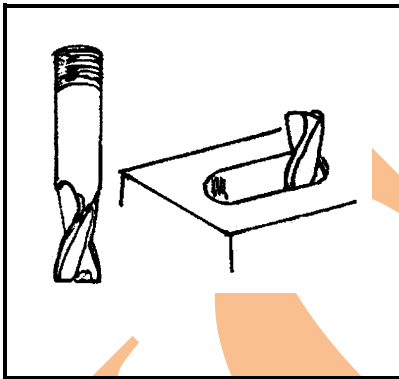
4.1 Use TABLE 1 below and calculate the indexing to be done to cut a gear with 19 teeth using a Brown and Sharpe dividing head.

Brown and Sharpe dividing head						
Number of holes						
Plate 1	15	16	17	18	19	20
Plate 2	21	23	27	29	31	33
Plate 3	37	39	41	43	47	49

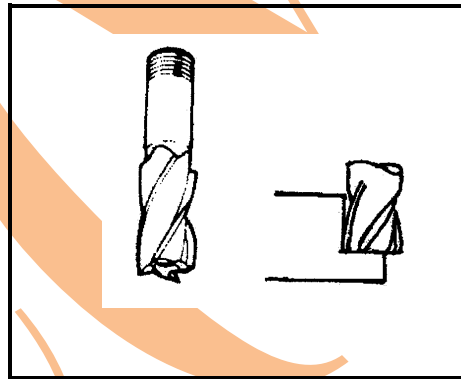
**TABLE 1**

(5)

4.2 FIGURE 4(a) and FIGURE 4(b) below, shows two milling machine processes. Identify the machining process and the cutting tool in both figures.



**FIGURE 4(a)**



**FIGURE 4(b)**

(4)

4.3 Complete the following paragraph by using the word(s) given in the list below. Write only the word(s) next to the question number (4.3.1–4.3.4) in the ANSWER BOOK

fed; fit; stationary; hand wheel; work piece; run
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When drilling on a centre lathe the (4.3.1.) ... revolves and the drill is in a (4.3.2) ... position in the tailstock. The drill must be (4.3.3) ... into the work piece by means of the tailstock (4.3.4) ...

(4 × 1)

(4)

- 4.4 What type of a drilling machine is shown in FIGURE 5 below? (1)
- 4.5 Label the parts of a drilling machine numbered (1–6) in the ANSWER BOOK.

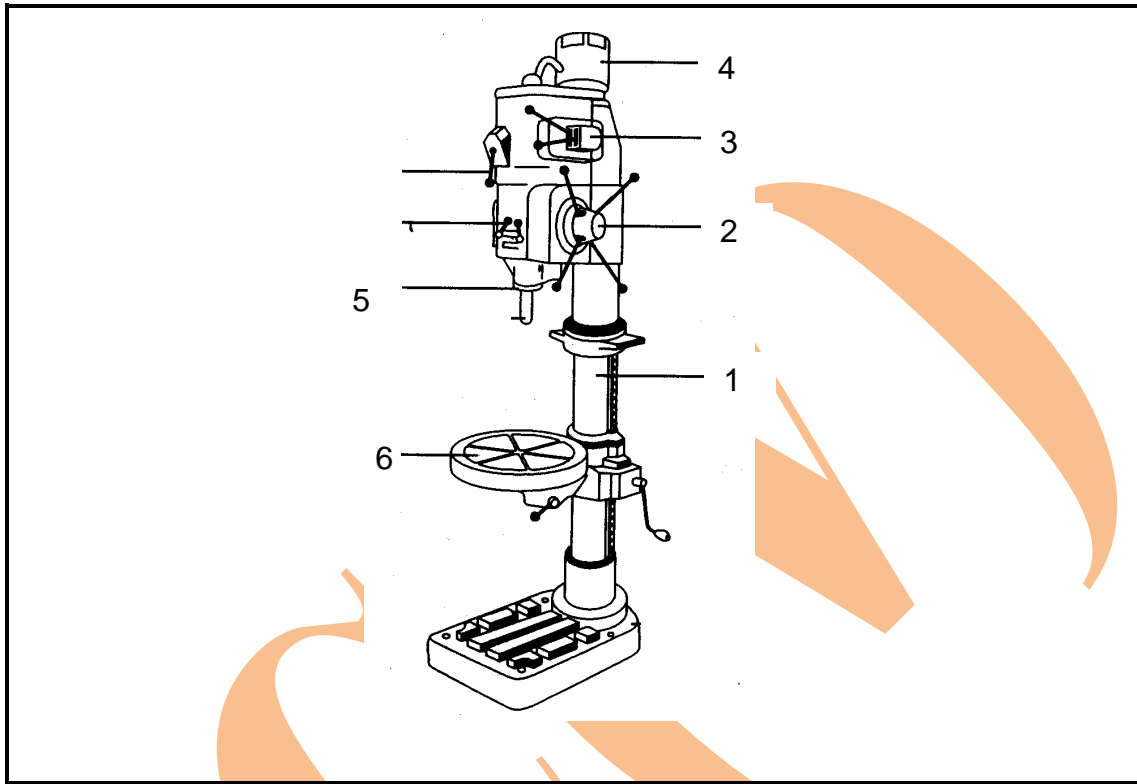


FIGURE 5

(6)  
[20]

TOTAL: 100