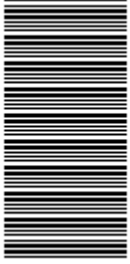


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**higher education  
& training**

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

**NATIONAL CERTIFICATE (VOCATIONAL)**

**MACHINE MANUFACTURING  
NQF LEVEL 3**

**NOVEMBER EXAMINATION**

(6030203)

**20 November 2014 (X-Paper)  
09:00–12:00**

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

**TIME: 3 HOURS  
MARKS: 100**

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**INSTRUCTIONS AND INFORMATION**

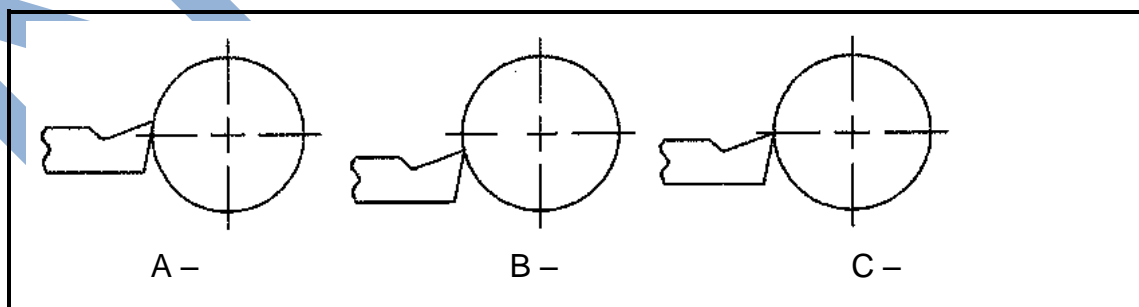
1. Answer ALL the questions.
  2. Read ALL the questions carefully.
  3. Subsections of questions may NOT be separated.
  4. Number the answers according to the numbering system used in this question paper.
  5. Sketches must be neat.
  6. Write neatly and legibly.
-

**SECTION A****QUESTION 1**

- 1.1 Give THREE reasons why machine guards are so important. (3)
- 1.2 Explain why it is prohibited to work on a machine wearing loose clothes and on a wet floor. (2)
- 1.3 List FOUR possible ways to prevent accidents in the workshop. (4)
- 1.4 Name the colour of the emergency stop button and give a reason for the choice of the colour. (2)
- 1.5 Demarcation lines are important in the workshop to avoid accidents. (4)
- What other things in the workshop can be indicated by demarcation lines? [15]

**QUESTION 2**

- 2.1 What is the purpose of CAD in manufacturing? (2)
- 2.2 State FIVE advantages of CAD applications. (5)
- 2.3 A lathe centre can be used to set cutting tools to the correct height. Refer to FIGURE 1 below and identify the different settings. Write only the answer next to the number (A–C) in your ANSWER BOOK.

**FIGURE 1**

(3)

2.4 Identify the functions of the following CAD commands:

- 2.4.1 Circle
- 2.4.2 Polyline
- 2.4.3 Off-set
- 2.4.4 Polygon
- 2.4.5 Fillet

(5 × 1) (5)  
[15]

**TOTAL SECTION A: 30**

**SECTION B**

**QUESTION 3**

3.1 What is meant by the term *interference fit*? (1)

3.2 Explain the following terms:

- 3.2.1 Running fit
- 3.2.2 Sliding fit
- 3.2.3 Push fit
- 3.2.4 Driving fit
- 3.2.5 Shrink fit

(5 × 1) (5)

3.3 The size of a work piece is given as  $150^{+0.03}_{-0.03}$ .

Determine the following:

- 3.3.1 Upper limit
- 3.3.2 Lower limit
- 3.3.3 Tolerance
- 3.3.4 Lower deviation

(4 × 1) (4)

3.4 According to the surface of materials, draw the symbol that relates to the following:

3.4.1 Removal of material is required

3.4.2 Removal of material is not allowed

3.4.3 Flame cut

3.4.4 Burnished

3.4.5 Cold rolled

(5 × 1) (5)  
[15]

#### QUESTION 4

4.1 Give FIVE advantages of using cutting fluid on a machine.

(5)

4.2 A drill 25 mm in diameter is used to drill a hole in brass.

Calculate the cutting speed in mm/s if the drilling machine is set at 145 rev/min.

(4)

4.3 Explain by using freehand drawings the following common machining symbols:

4.3.1 Countersinking

4.3.2 Counterboring

4.3.3 Reaming

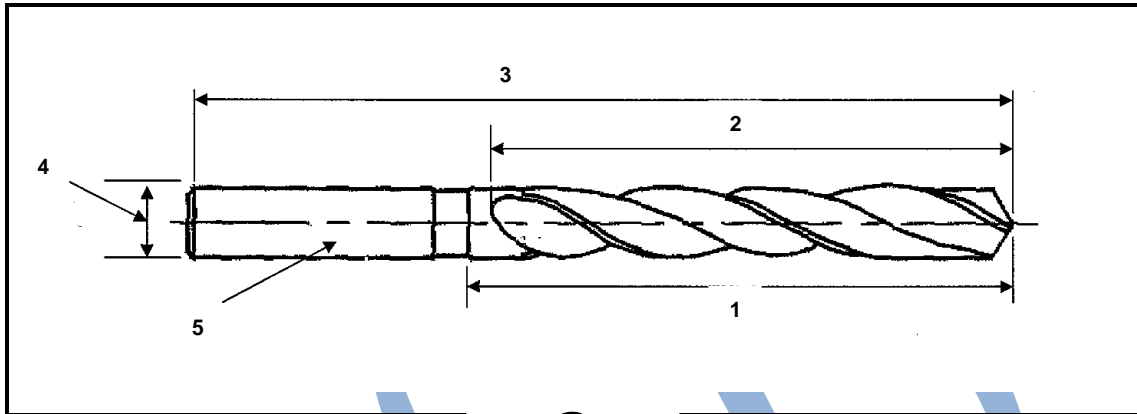
4.3.4 Spot facing

4.3.5 Tapping threaded hole

4.3.6 Chamfering

(6 × 1) (6)

4.4 Parallel shank drills are also called jobber drills. They are usually found up to 13 mm in diameter and are fitted into a drill chuck. FIGURE 2 below shows a parallel shank drill. Identify the labelled sections of the drill. Write down the label number and the answer in your ANSWER BOOK.



FI 3

(5)  
[20]

**QUESTION 5**

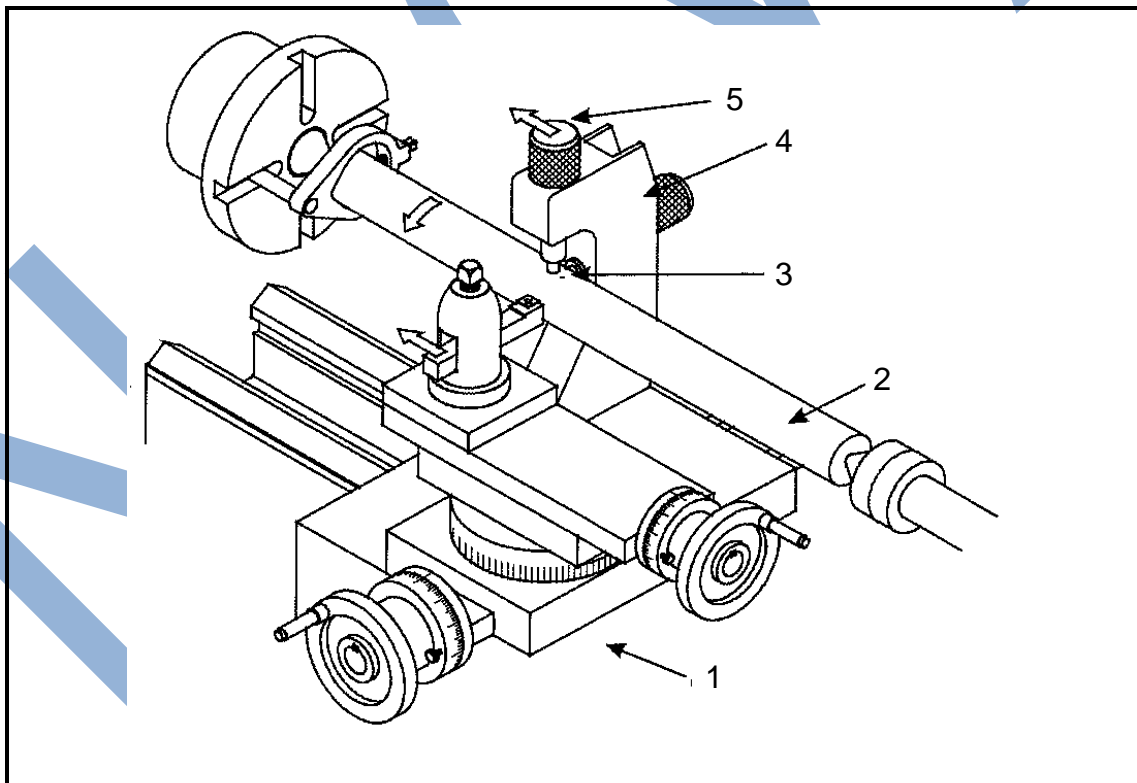
5.1 Name THREE turning operations that can be done on a centre lathe. (3)

5.2 Holding or mounting a workpiece on a lathe has many advantages and disadvantages.

Recommend THREE advantages of holding a workpiece between centers when doing turning on a lathe. (3)

5.3 On lathes, long slender workpieces often require extra support to prevent vibration, as well as the pressure of the tool pushing the work away from it. To prevent this, supports are used. FIGURE 3 below shows a travelling steady.

Identify the various components of the steady. Write only the answer next to the numbers (1–5) in your ANSWER BOOK.



**FIGURE 3** (5)

5.4 Use a freehand drawing to illustrate the operation of a parting tool. Also show the direction of the parting tool and the hand feed. (3)

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

- 5.6 You are given a job instruction sheet to machine an engine part on a milling machine.

Generate FIVE basic steps of the operation to be followed to complete the job. Only highlight the key issues that you will look at, from studying the instruction sheet to the final production.

(5)

- 5.7 You are required to machine two grooves on a shaft by using a milling machine. The grooves are separated at an angle of 35 degrees. Use the Brown & Sharp dividing head to calculate the indexing required, turning the workpiece at the required angle.

The details of the Brown & Sharp dividing head are as follows:

Plate 1 15, 16, 17, 18, 19 and 20 holes

Plate 2 21, 23, 27, 29, 31 and 33 holes

Plate 3 37, 39, 41, 43, 47 and 49 holes

(5)



5.8 FIGURE 4 below shows a Knee Type Milling Machine. Identify the various components of the milling machine. Write only the answers next to down the numbers (1–7) and the answer next to the respective number in your ANSWER BOOK.

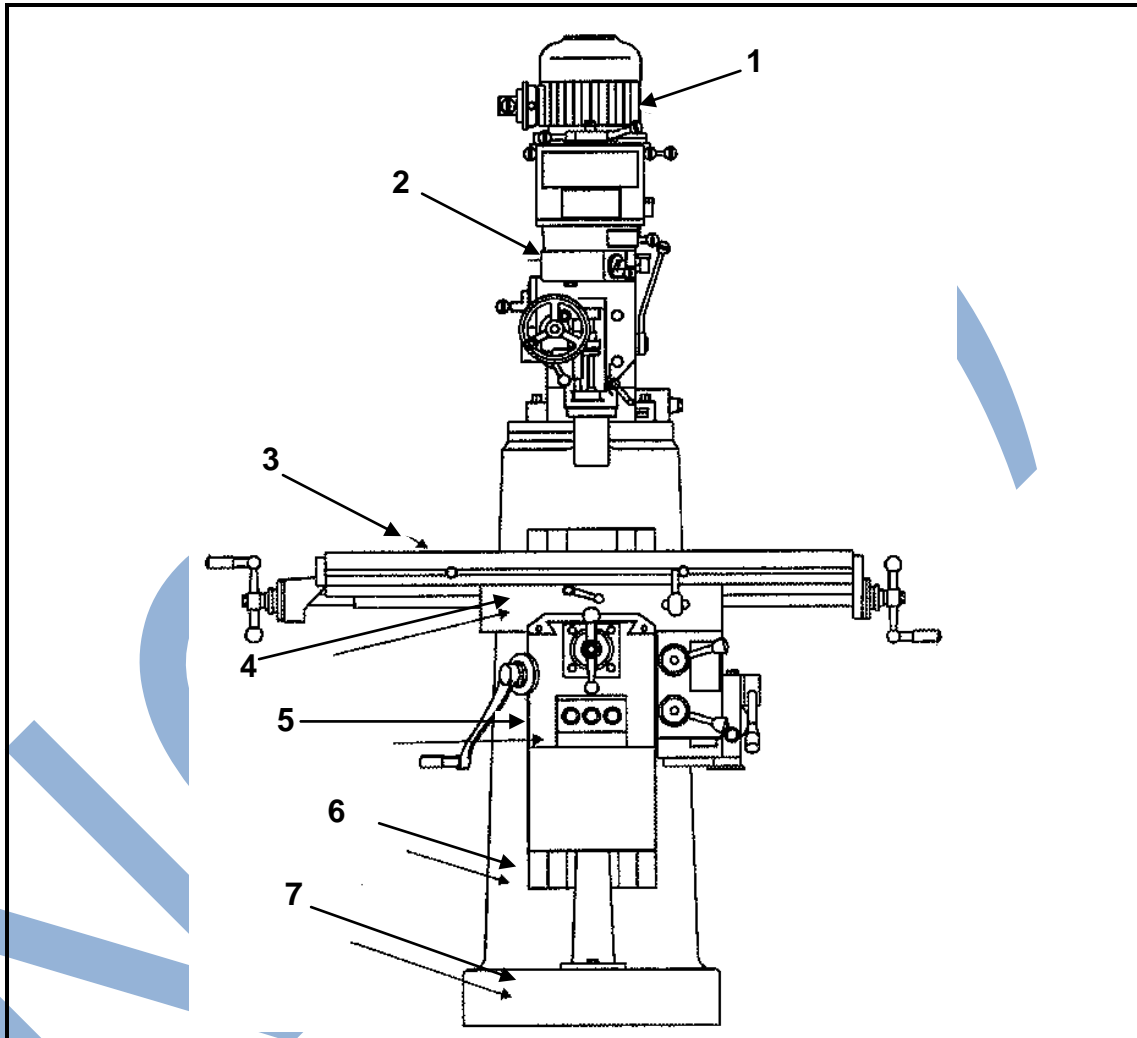


FIGURE 4

(7)  
[35]

TOTAL SECTION B: 35  
GRAND TOTAL: 100