

**higher education  
& training**

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

**NATIONAL CERTIFICATE (VOCATIONAL)**

**MACHINE MANUFACTURING  
NQF LEVEL 3**

**NOVEMBER 2011**

**(6030203)**

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

**This question paper consists of 7 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.
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**SECTION A****QUESTION 1: MACHINE SAFETY**

- 1.1 Name FIVE basic types of machine guards. (5)
- 1.2 Give TWO examples of what is considered unsafe items of clothing used when working with rotating machinery. (2)
- 1.3 List FOUR possible ways to prevent accidents in the workshop. (4)
- 1.4 A machinist is doing taper turning on a centre lathe.  
Perform a machine risk assessment by means of a rating scale on the above workshop situation. (2)
- 1.5 Demarcation lines are important in the workshop to avoid accidents. Name TWO other things in the workshop that can be indicated by demarcation lines. (2)
- [15]**

**QUESTION 2: CAD APPLICATIONS**

- 2.1 Name any TWO disadvantages of CAD in manufacturing industry. (2)
- 2.2 Indicate whether the following are CAD applications. Write 'YES' or 'NO' next to the question number in your answer sheet.
- 2.2.1 Microsoft (1)
- 2.2.2 Caddie (1)
- 2.2.3 Paintbrush (1)
- 2.2.4 Turbocad (1)
- 2.2.5 Inventer (1)
- 2.3 Explain the function of the following modifying objects of CAD commands.
- 2.3.1 undo (1)
- 2.3.2 move (1)
- 2.3.3 scale (1)
- 2.3.4 erase (1)
- 2.3.5 copy (1)

- 2.4 Tapping holes in a work piece is a tricky process and faults can easily occur. Discuss THREE causes of thread cutting faults with taps. (3)  
[15]

**TOTAL SECTION A 30**

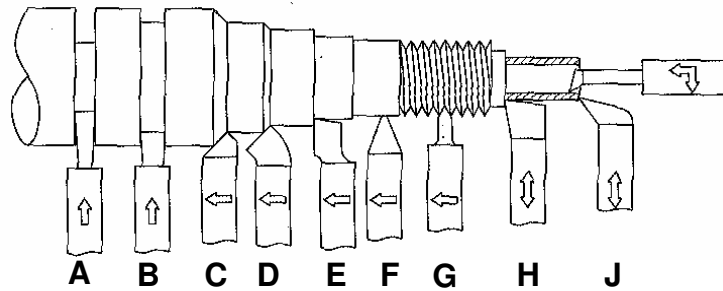
## **SECTION B**

### **QUESTION 3: I.S.O. FITS AND LIMITS**

- 3.1 What is meant by the term *shrink fit*? (1)
- 3.2 Explain in your own words what is meant by the following.
- 3.2.1 Hole basis system (2)
- 3.2.2 Shaft basis system (2)
- 3.3 The size of a locating pin is given as  $125 \pm 0.02$ .
- 3.3.1 What is the basic size? (1)
- 3.3.2 What is the actual size? (1)
- 3.3.3 What is the upper limit? (1)
- 3.3.4 What is the tolerance? (1)
- 3.4 Draw the symbol that relates to the following according to the surface texture of materials.
- 3.4.1 To show that a work piece must be turned to a surface texture of 1,6 microns. (1)
- 3.4.2 To show that the removal of material is not allowed. (1)
- 3.5 Show with the aid of a freehand sketch the difference between countersink and counterbore holes. (4)  
[15]

**QUESTION 4: CENTRE LATHE AND MILLING MACHINE**

- 4.1 Give FIVE advantages of using cutting fluid on a machine. (5)
- 4.2 Calculate the cutting speed in metres per minute if a 20 mm diameter hole must be drilled into a piece of mild steel at 1,5 revolutions per second. (5)
- 4.3 FIGURE 1 below shows different cutting tools used on material.

**FIGURE 1**

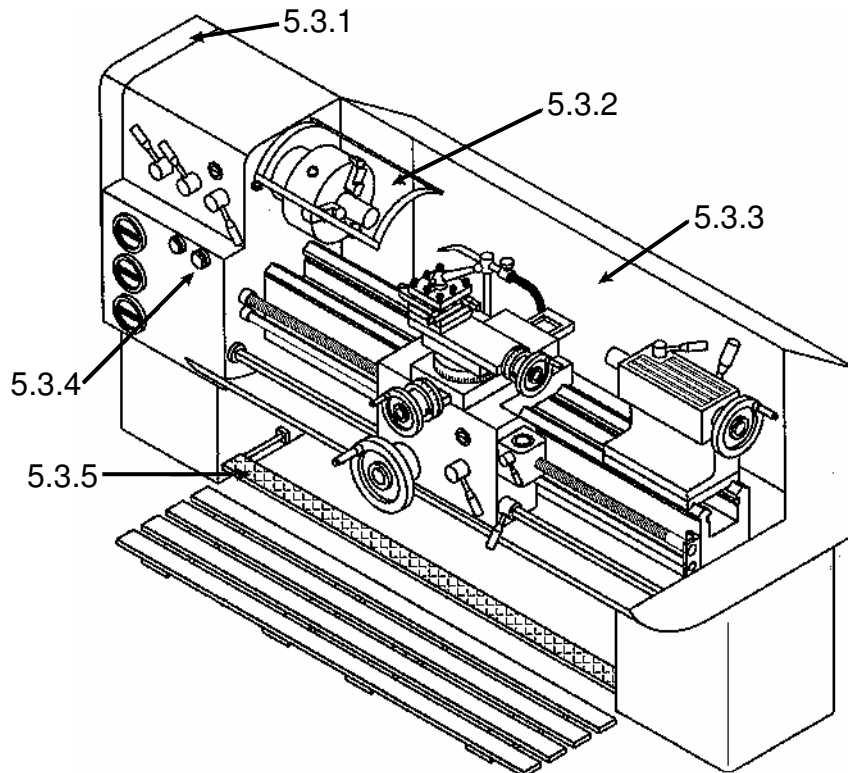
Identify each of the following cutting tools using the sketch. Write the correct letter next to the question number (4.3.1 – 4.3.5) in the ANSWER BOOK.

- 4.3.1 right-hand knife tool (1)
- 4.3.2 the screw cutting tool (1)
- 4.3.3 grooving tool (1)
- 4.3.4 roughing tool (1)
- 4.3.5 facing tool (1)
- 4.4 Name FOUR methods of identification and testing of metals so that proper work methods can be applied. Example: heat treatment if required. (4)
- 4.5 Would you use a soft or hard grinding wheel on very hard material? (1)

**[20]**

**QUESTION 5: CENTRE LATHE AND MILLING MACHINE**

- 5.1 List THREE operations that can be done on a milling machine. (3)
- 5.2 Give THREE methods that can be used to hold a work piece on the lathe. (3)
- 5.3 When working on a lathe, there are a number of safety measures that need to be considered. FIGURE 2 shows FIVE safety components. Write down the label number and the correct answer next to the question number (5.3.1 – 5.3.5) in the ANSWER BOOK.

**FIGURE 2**

- (5)
- 5.4 By means of a freehand drawing show both the top rake and front clearance angles on high-speed steel (HSS). (2)
- 5.5 Name FOUR different types of indexing that a universal dividing head could perform. (4)
- 5.6 Name TWO malfunctions (problems) that can occur while operating a milling machine. (2)
- 5.7 Discuss FOUR pre-operational checks one needs to do before operating a milling machine. (4)

5.8 Calculate the required indexing for a gear with 44 teeth using a Brown and Sharp dividing head. The details of Brown and Sharp dividing head are:

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)

5.9 FIGURE 3 below shows a Dividing Head.

Identify the different components of the dividing head. Write down the number and the correct answer next to the question number (5.9.1 – 5.9.7) in the ANSWER BOOK.

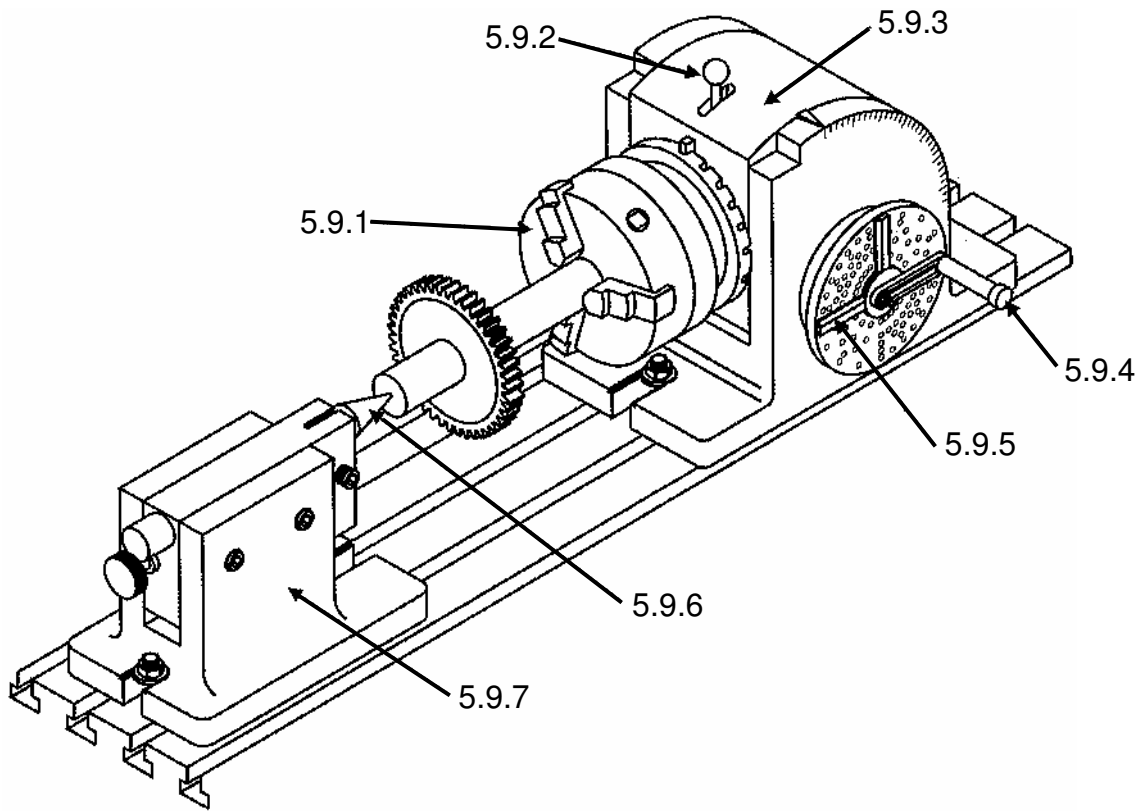


FIGURE 3

(7)  
[35]

TOTAL SECTION B: 70  
GRAND TOTAL: 100