higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MACHINE MANUFACTURING
NQF LEVEL 3

(6030203)

27 February 2023 (X-paper)
09:00–12:00

This question paper consists of 8 pages.

281Q1S2327

TIME: 3 HOURS
MARKS: 100

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.

QUESTION 1

1.1 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–F) next to the question number (1.1.1–1.1.4) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.1.1	When a machine guard closes by itself when the start button is pushed	A	mushroom head
		B	injuries
1.1.2	Contact with harmful chemicals	C	safety hazard
1.1.3	Shape of an e-stop button	D	automatic guard
1.1.4	Contact with pressurised gas or liquid	E	health hazard
		F	interlocking guard

(4 × 1) (4)

1.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

1.2.1 Ventilation in a workshop helps a person to focus better when working.

1.2.2 Some machines have extra lighting for the operator to see well.

1.2.3 It is not a good idea to ask for help when lifting heavy materials.

1.2.4 The position of machines relative to one another is an important factor.

1.2.5 One of the main causes of accidents is the lack of training on a machine.

(5 × 1) (5)

1.3 List the FIVE stages of risk assessment. (5)

1.4 Give the formula that is used when doing risk assessment. (1)

[15]

QUESTION 2

2.1 Explain each of the following fits:

2.1.1 Push fit

2.1.2 Sliding fit

2.1.3 Running fit

2.1.4 Shrink fit

(4 × 2) (8)

2.2 Draw the symbol for each of the following surface textures:

2.2.1 Flame cut

2.2.2 Cold rolled

2.2.3 Chrome plated

(3 × 1) (3)

2.3 Draw the symbol for each of the following machining processes:

2.3.1 Spot facing

2.3.2 Counterboring

2.3.3 Countersinking

2.3.4 Chamfering

(4 × 1) (4)

[15]

QUESTION 3

3.1 Choose a rake angle from COLUMN B that matches a material type in COLUMN A. Write only the letter (A–D) next to the question number (3.1.1–3.1.4) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.1.1	Aluminium	A	0°
3.1.2	Cast iron	B	20°
3.1.3	Mild steel	C	30°
3.1.4	Copper	D	25°

(4 × 1) (4)

3.2 FIGURE 1 shows different holding fixtures.

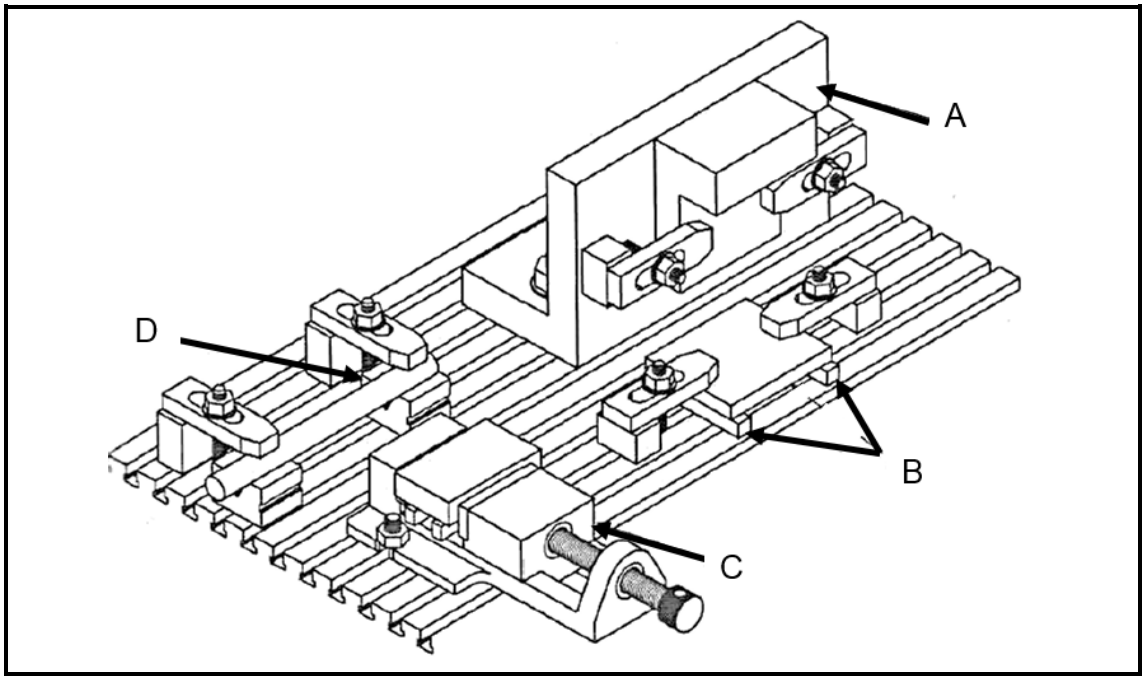

FIGURE 1

Name the different fixtures by writing only the answer next to the letter (A–D) in the ANSWER BOOK. (4 × 1) (4)

3.3

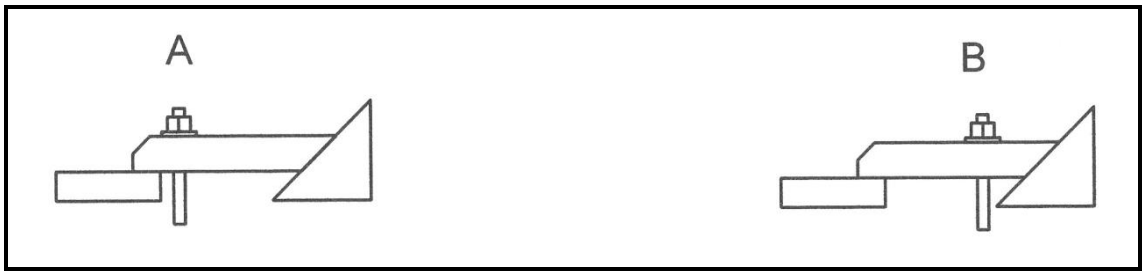

FIGURE 2

Identify the correct clamping method in FIGURE 2 by writing down only the letter A or B next to the question number (3.3) in the ANSWER BOOK. (2)

3.4 A drill 14 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 220 r/min. (5)

[15]

QUESTION 4

4.1 Name FOUR types of centres that can be used on a lathe. (4)

4.2 List THREE things to keep in mind before turning a workpiece on a lathe. (3)

4.3 Show, by means of a neat sketch, the difference between a *tool too high* and a *tool too low* when setting up a lathe. (2 + 2) (4)

4.4 FIGURE 3 shows a lathe.

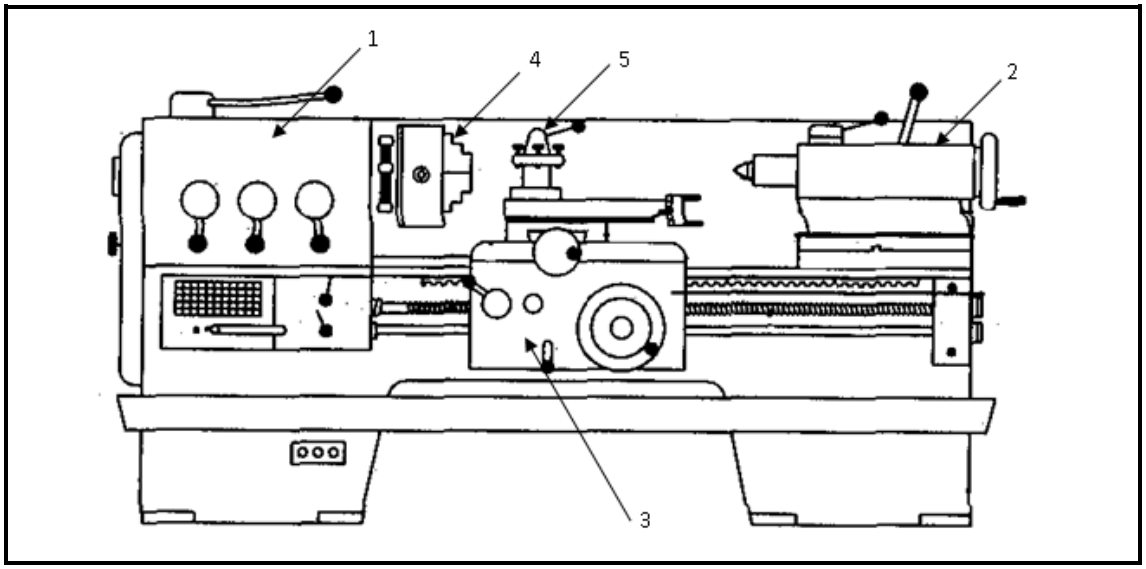

FIGURE 3

Name the parts of the lathe by writing only the answer next to the number (1–5) in the ANSWER BOOK. (5 × 1) (5)

4.5 You are required to machine 31 grooves on a shaft by using a milling machine. Use a Brown & Sharpe dividing head to calculate the required indexing.

The details of the Brown & Sharpe 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)

4.6 Show, by means of a neat sketch, the difference between *climb milling* and *conventional milling*. Remember to show the direction of feed and the rotation of the cutter. (3 + 3) (6)

4.7 Which cutter will be used to cut the T-slots on a milling machine table? (2)

4.8 FIGURE 4 shows a dividing head of a milling machine.

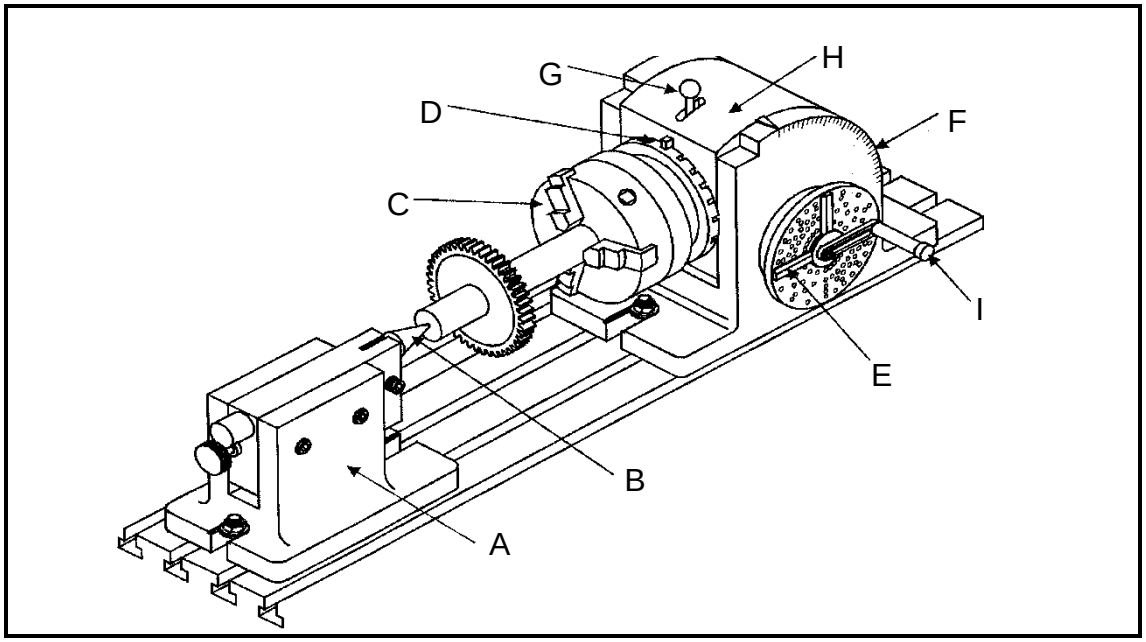

FIGURE 4

Identify the components of the milling machine by writing only the answer next to the letter (A–I) in the ANSWER BOOK. (9 × 1) (9)

4.9 Which other tool, besides a dowel, can be used to find the edge of a workpiece on a milling machine? (2)

[40]

QUESTION 5

5.1 Tabulate THREE examples of input devices and THREE examples of output devices. (3 + 3) (6)

5.2 Give TWO advantages and TWO disadvantages of using a CAD application. (2 + 2) (4)

5.3 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (5.3.1–5.3.3) in the ANSWER BOOK.

5.3.1 The command *Ellipse* can be used to draw a circle if used properly.

5.3.2 A 3D figure depicts a flat surface appearing in length and breadth.

5.3.3 CAM means computer-aided measurement. (3 × 1) (3)

5.4 Explain the function of the *Trim* CAD command. (2)

[15]

TOTAL: 100