higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MACHINE MANUFACTURING
NQF LEVEL 3

SUPPLEMENTARY EXAMINATION

(6030203)

23 February 2016 (X-Paper)
09:00–12:00

This question paper consists of 9 pages.

TIME: 3 HOURS
MARKS: 100

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.

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 Which ONE of the following will cause a drill bit to break during a drilling operation?

A Abuse and mishandling
B Incorrect grinding of the point
C Using too much coolant
D Cleaning the bit before use

1.1.2 What protective clothing equipment would you consider to be most important when using a surface grinder?

A Boots
B Spats
C Overalls
D Goggles

1.1.3 Good housekeeping simply means:

A A very good house that looks very attractive
B Screwdrivers are kept together with hammers
C There is a place for everything, put everything in its place
D Files are kept with hacksaws

1.1.4 Which ONE is not a drilling process?

A Radial arm drill
B Countersinking
C Spot facing
D Counterboring

1.1.5 What is the function of using cutting fluid?

A To create heat during the cutting process
B To cut the workpiece
C To minimise the effect of heat and friction
D To be absorbed by the workpiece

(5 x 1) (5)

1.2 Choose a description from COLUMN B that matches an item from COLUMN A. Write only the letter (A–G) next to the question number (1.2.1–1.2.6) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.2.1	Fixed guards	A	it includes things that make a workplace safe
1.2.2	Interlocking guards	B	they move into position as soon as the machine is switched on
1.2.3	Automatic guards	C	it switches off the power to the motor if it is removed
1.2.4	Safety equipment	D	this prevents an electric circuit from being switched on
1.2.5	Lock out	E	a book that contains information and guidelines about the company's health and safety values
1.2.6	Safety procedure manual	F	it prevents the machine's moving parts from coming into contact with any parts of your body
		G	ways of doing things the safe way

(6 x 1) (6)

1.3 1.3.1 Differentiate between *unsafe acts* and *unsafe conditions.* (2)

1.3.2 By means of a freehand sketch, show the difference between *countersink* and *counterbore* drilling processes. (2)

[15]

QUESTION 2

2.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (2.1.1–2.1.6) in the ANSWER BOOK.

2.1.1 One of the advantages of using a CAD software package is that it is cheap.

2.1.2 In a CAD program, toolbars can be placed in any position on the screen to give access to the given tools.

2.1.3 CAM means computer-aided measurement.

2.1.4 Command ellipse can be used to draw a circle if used properly.

2.1.5 CAD can be used for direct manufacturing as in the case of a CAD/CAM system.

2.1.6 CAE means computer-aided engineering system.

(6 x 1) (6)

2.2 Explain the functions of the following CAD commands:

2.2.1 Polygon

2.2.2 Arc

2.2.3 Erase

(3 x 1) (3)

2.3 FIGURE 1 shows a task being performed on a milling machine. Identify the different components and write the names next to the question numbers (2.3.1–2.3.4) in the ANSWER BOOK.

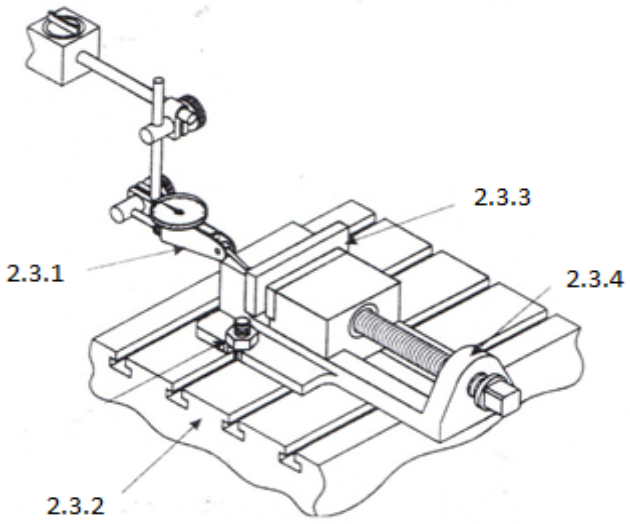

FIGURE 1 (4)

2.4 By means of freehand sketches show the difference between a *dotting punch* and a *centre punch*. (2)

[15]

QUESTION 3

3.1 FIGURE 2 shows a visual representation of a clearance fit between a bush and a shaft. Labels A–F represent various terms associated with fits and limits. Identify these terms. Write only the answer next to the letter (A–F) in the ANSWER BOOK.

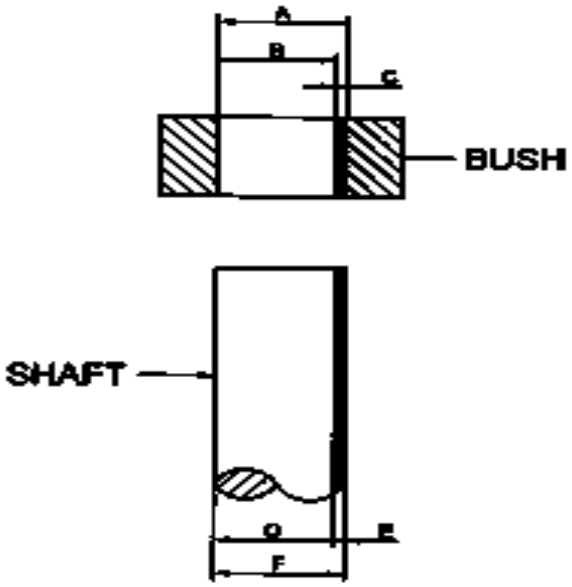

FIGURE 2 (6 x 1) (6)

3.2 Refer to FIGURE 3 below and answer the questions.

$$150^{+0.03}_{-0.03}$$

FIGURE 3

Write down the ISO terms for the following:

3.2.1 150,00

3.2.2 +0,03

3.2.3 -0,03

(3 x 1) (3)

3.3 With reference to FIGURE 3, calculate the tolerance of the machined component. (1)

3.4 A running fit between a shaft and a bearing is given as: 45 H7 – p 6.

Determine the meaning of the symbols used in this code. (5)

[15]

QUESTION 4

4.1 You are required to work on a centre lathe using a three-jaw chuck. You discover that there is no chuck in the machine spindle; instead, there are loose chuck jaws as well as a chuck lying on top of the work bench.

Rearrange the different jaws and write down in sequence the FIVE steps to be followed when inserting chuck jaws in a three-jaw chuck. (5 x 1) (5)

4.2 FIGURE 4 shows a workpiece being held between centres during machining. Carefully study the operation and label the components that are marked 4.2.1–4.2.5.

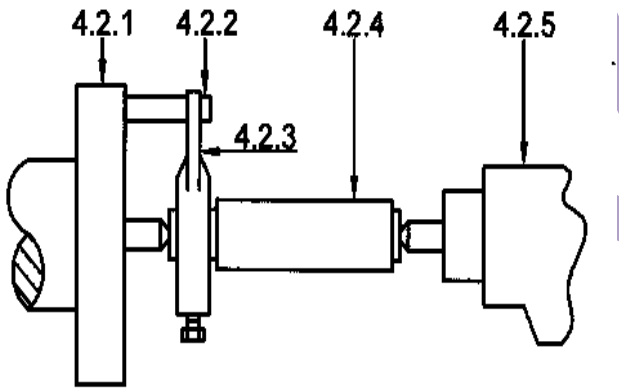

FIGURE 4 (5 x 1) (5)

4.3 A milling machine cutter of 100 mm in diameter has 14 teeth. The cutting speed for the machine is given as 24 mm/min and the feed per tooth is 0,051 mm.

Calculate the rotational frequency and the feed rate. (5)
[15]

QUESTION 5

5.1 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–F) next to the question number (5.1.1–5.1.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
5.1.1	Trigger lock	A	used for removing and replacing parts such as gears, pulleys and bearings
5.1.2	Angle grinder	B	has a tungsten carbide tip that is brazed to the cutting end of a twisted flute shank
5.1.3	Hydraulic press	C	engaged for continuous drilling
5.1.4	Compressor	D	has a disc mainly for cutting metal or masonry
5.1.5	Masonry drill	E	turns automatically on when the preset pressure decreases
		F	used to lock the spindle

(5 x 1) (5)

5.2 Give TWO advantages and TWO disadvantages of holding a workpiece between centres. (2 x 2) (4)

5.3 Name FOUR different types of indexing methods that you know of. (4 x 1) (4)

5.4 Name TWO parts/components that make up the dividing head. (2)

5.5 You are requested to machine and produce a gear with 23 teeth using a Cincinnati dividing head. Answer the following questions:

5.5.1 What type of indexing method would you perform on this gearblank? (1)

5.5.2 Give a reason for the answer in QUESTION 5.5.1 above. (1)

5.5.3 Calculate the required indexing, using a Cincinnati dividing head as shown in TABLE 1 below.

Side 1	24	25	28	30	34	37	38	39	41	42	43
Side 2	46	47	49	51	53	54	57	58	59	62	66

TABLE 1

(5)

5.6 Identify the fitting-and-turning machine cutting tools marked 5.6.1–5.6.5 in FIGURE 5 below.

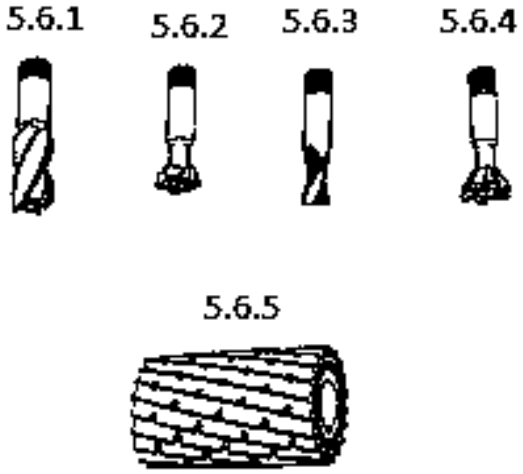

FIGURE 5 (5 x 1) (5)

5.7 Name any FOUR milling processes that can be performed by a milling machine. (4)

5.8 Name TWO advantages and TWO disadvantages of down-cut milling. (2 x 2) (4)
[35]

QUESTION 6

6.1 FIGURE 6 shows a machine that is crucial in a fitting and machining work-shop.

FIGURE 6

6.1.1 Name the machine shown in FIGURE 6. (1)

6.1.2 Identify the different components marked A–D. Write only the answer next to the letter (A–D) in the ANSWER BOOK (4 x 1) (4)
[5]

TOTAL: 100