higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T40**(E)**(A8)T

# NATIONAL CERTIFICATE

# AIRCRAFT METALWORK THEORY N3

(11021113)

**8 August 2018 (X-Paper)**
**09:00–12:00**

**This question paper consists of 6 pages and 1 diagram sheet.**

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# DEPARTMENT OF HIGHER EDUCATION AND TRAINING
# REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
AIRCRAFT METALWORK THEORY N3
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. ALL sketches must be neat and developments must be drawn using drawing instruments.
5. Start each question on a NEW page.
6. Write neatly and legibly.

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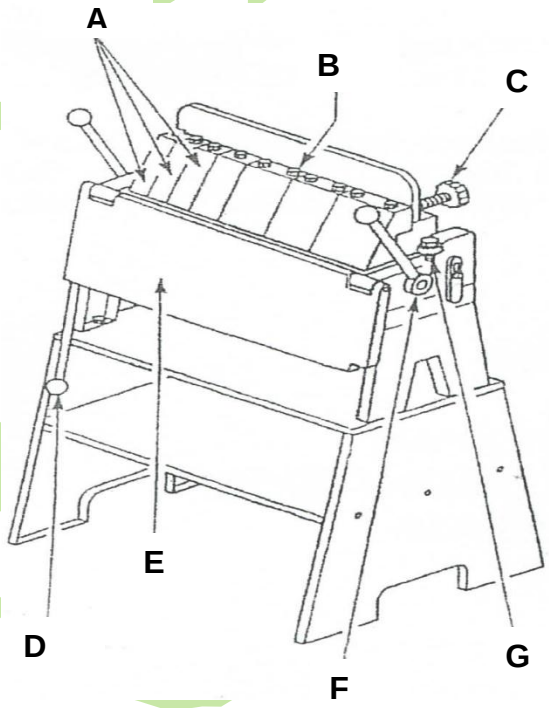
## QUESTION 1: DEVELOPMENT

FIGURE 1, DIAGRAM SHEET 1, shows the surface development of a cylinder cut at an angle at 40°. ALL dimensions are in millimetres.

Copy the figure in the ANSWER BOOK and then develop the full structure. Show ALL the projection lines on the development. **[15]**

## QUESTION 2: TOOLS

2.1 Below is a sketch of a bending pan brake. Label the parts A–G.




(7)

2.2 Most metals have a tendency to return to their normal shape.

What do you call this tendency? (1)

2.3 Describe the use of a Barcol tester and how would you use this tool? (7)

**[15]**

## QUESTION 3: MATERIALS

3.1 Explain the FOUR steps in the process of hardening aluminium alloy by heat treatment. (4)

3.2 The FOUR digit designation for an alloy is usually followed by a letter separated from the main number by a dash. This letter indicates the condition of the alloy.

Identify the meaning of the following standard letters:

3.2.1 F (1)

3.2.2 O (1)

3.2.3 H (1)

3.2.4 F (2)

3.2.5 W (2)

3.3 Titanium alloy does not respond to heat treatment.

Choose TWO treatment methods done on titanium alloys. (2)

3.4 When drilling operations must be done on titanium certain operations are required.

Discuss the operation when drilling titanium (2)
**[15]**

## QUESTION 4: CORROSION

4.1 4.1.1 Describe how dissimilar metal corrosion can be identified on aircrafts. (3)

4.1.2 How will you treat the dissimilar metal corrosion? (2)

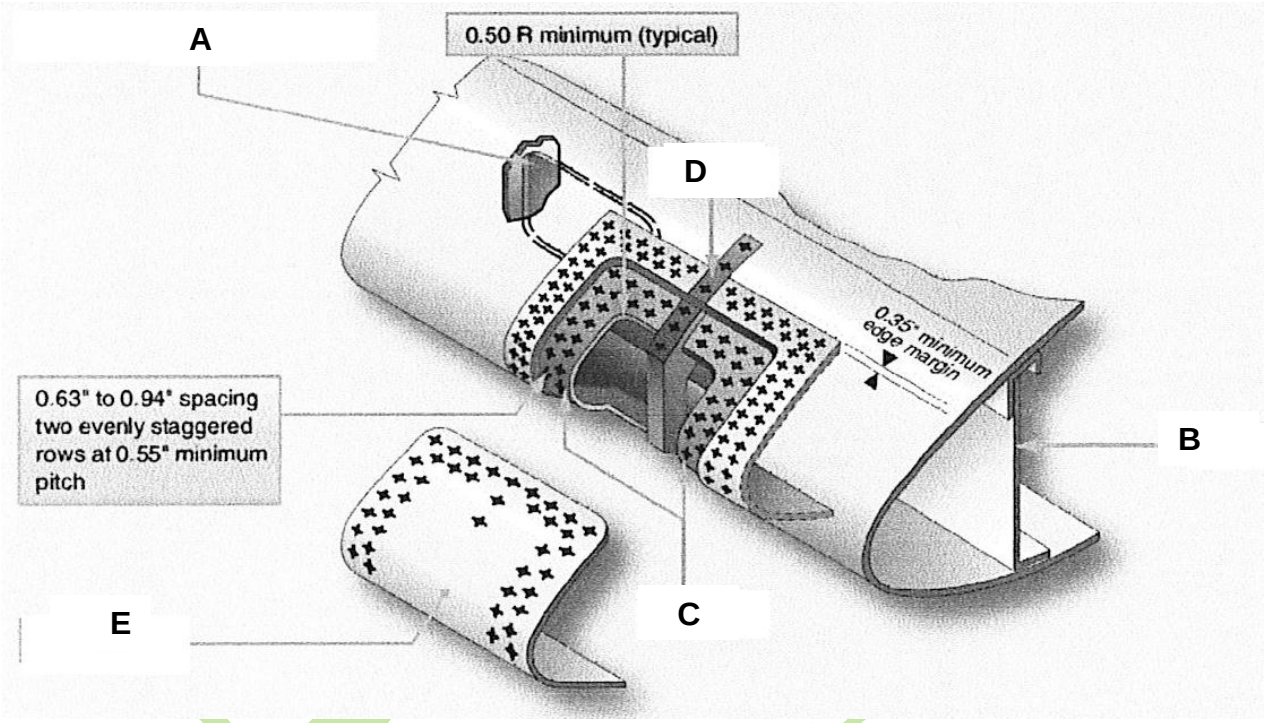
4.2 Discuss the allodine process of treating aluminium alloys against corrosion. (5)
**[10]**

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## QUESTION 5: REPAIRS

5.1 The illustration below is of a flush patch repair on the leading edge of a wing.

Name the parts marked A–E.




(5)

5.2 Describe how to do a flash patch repair on the skin of an aircraft. (10)

5.3 A router is used during the repair on a honeycomb structure.

Explain the procedure when using a router to remove the damaged area on the honeycomb. (10)

**[25]**

## QUESTION 6: GENERAL

6.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–C) next to the question number (6.1.1–6.1.5) in the ANSWER BOOK.

6.1.1 Dollies and stakes are used for forming …

A a joggle in a support bracket.
B a bend along the edges of sheets.
C small odd shape parts, or for finishing touches for which large machines are not suitable.

6.1.2 Scroll shears are used for …

A nibbling away small pieces of material until the correct size is obtained.
B cutting long pieces of material in a straight line.
C cutting irregular lines on the inside of a sheet.

6.1.3 The most commonly used aluminium alloy sheets on aircraft today are …

A 2024-T3 and 6061- T3.
B 2024-T3 and 7075- T6.
C 7075-T6 and 5052 - H36.

6.1.4 Sealing a fuselage structure may be necessary for the following reasons:

A To seal pressurised compartments
B To seal fuel tanks
C Both (A) and (B)

6.1.5 What is the minimum spacing for a single row of aircraft rivets?

A Two times the diameter of the rivet shank
B Two times the diameter of the rivet head
C One-half the thickness of the material being used

(5 × 1) (5)

6.2 Taper-lock fasteners are used on big, stressed primary structures. Great care must be taken to drill and ream new parts within the whole limit.

Discuss how to fit taper-lok fasteners. (10)

6.3 Discuss how a slip-roll former is used to make a cylinder or a duct. (5)

**[20]**

**TOTAL: 100**

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## DIAGRAM SHEET 1

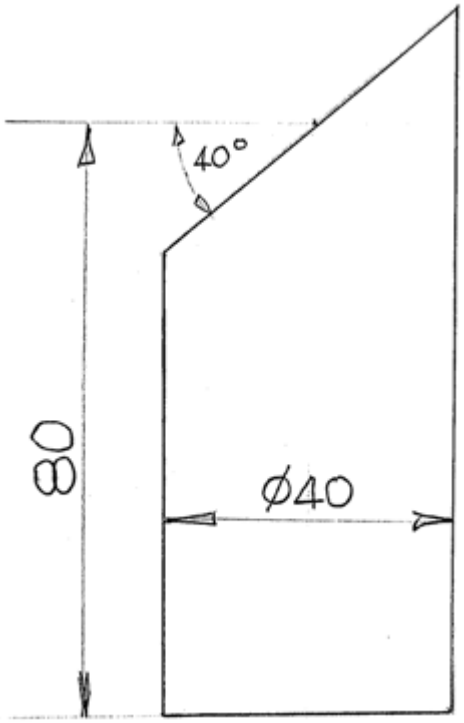



**FIGURE 1**

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