higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T20**(E)**(A9)T

NATIONAL CERTIFICATE

AIRCRAFT MAINTENANCE THEORY N3

(11041113)

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This question paper consists of 6 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
AIRCRAFT MAINTENANCE THEORY N3
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. Sketches must be large, neat and fully labelled.
5. Write neatly and legibly.

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QUESTION 1

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–C) next to the question number (1.1–1.6) in the ANSWER BOOK.

1.1 Duplicate inspections are required after ...

A a symmetry check has been carried out on the airframe.
B the rebuilding, overhaul, modification, repair or adjustment of any engine or flying control.
C 100 airframe flying hours have accumulated.

1.2 One of the conditions for doing airframe rigging checks is to ...

A place the aircraft in a rigging position.
B drain all fuel out of the tanks, including the unusable fuel.
C chock the wheels and apply the brakes.

1.3 The tinning of a soldering iron is done to ...

A increase the iron's capacity to store, feed, and withdraw solder from a joint.
B allow the flux to flow well.
C ensure that no blowholes, porosity and projecting globules develop during the soldering process.

1.4 Pressure testing of a flexible fuel tank is done in the workshop and requires a number of safety precautions. One of the precautions required is ...

A to use only hydrogen gas when pressurising the tank.
B to use an ultraviolet light to locate the source of the leak.
C to apply pneumatic pressure slowly during testing.

1.5 A disposable-type oil filter is a filter that requires ... during maintenance of the lubrication system.

A replacement with a new one
B proper cleaning of the filter element
C proper cleaning of the filter bowl to remove dirt

1.6 During a routine inspection, the ignition system leads of a gas turbine engine will be examined and tested. One of the tests to be completed is to ...

A look for waterlogged leads attached to the magneto.
B test for a proper connection on the magneto.
C perform a continuity check of ignition leads.

(6 × 1) **[6]**

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QUESTION 2

2.1 Duplicate inspections are not routine inspections, as it is normally done after working on aircraft control systems. However, they are very important.

Explain why duplicate inspections are so important. (6)

2.2 Explain the difference between *a hard landing* and *an overweight/overmass landing*. (4)

2.3 Visual detection is the oldest method of searching for cracks. However, it is very difficult to see minute cracks with the naked eye. To aid in the search for cracks, the industry has developed specialised tools and equipment.

Explain the Magnaflux crack detection process which was developed as an aid to finding cracks. (10)

2.4 Explain the heat treatment process of *annealing* as applied to aluminium and aluminium alloys. (2)

2.5 State the *purpose* of annealing as applied to aluminium and aluminium alloys. (1)

[23]

QUESTION 3

3.1 Corrosion presents a serious problem on aircraft due to the extent to which different metals are used on aircraft. An aircraft technician should therefore have a good knowledge of corrosion.

Explain the origin of galvanic or bimetallic corrosion. (5)

3.2 Brazing was done on an aircraft component, and the part has to be inspected after it was completed.

Explain what the brazed component has to be inspected for after completion. (5)

3.3 Explain the difference between a *wing dihedral check* and a *wing incidence check*. (4)

3.4 What is the purpose of airframe rigging checks? (2)

3.5 State the *primary purpose* and the *secondary purpose* of aircraft weight and balance. (4)

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QUESTION 4

4.1 Name the sensors a normal aircraft pitot static system consists of. (2)

4.2 Give any SIX examples of when it becomes necessary to calibrate (swing) a magnetic compass. (6)

4.3 Give any SIX items that need to be included in the inspection of a wiring bundle found in the leading edge of an aircraft wing. (6)

4.4 During the inspection of the flying control system, the pulleys are checked for condition.

State what defects would result in a pulley having to be scrapped and replaced. (4)

4.5 Flow testing of the fuel system is done to check the functioning of the fuel system.

Explain when flow testing is required. (3)

4.6 Define the engineering term *tolerance* as it applies to aircraft engines. (2)

4.7 During an engine overhaul the first step is to dismantle the engine. Certain precautions have to be taken during this procedure.

Give SIX of the precautions to be taken. (6)
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QUESTION 5

5.1 What would you look for during an inspection carried out on the fuel burner nozzles of a gas turbine engine? (2)

5.2 The lubrication system needs to be inspected on a regular basis.

Briefly explain the inspection that will be carried out on an oil cooler. (2)

5.3 The spark plugs of a piston engine have to be inspected during a routine maintenance.

Explain what you would look for during this inspection. (4)

5.4 What would you look for when inspecting a propeller hub (barrel) during a major inspection? (2)

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5.5 Give any SIX reasons why it is necessary to carry out test-cell running of an engine after it has been overhauled. (6)

5.6 After returning from a flight, the pilot reports that the engine is slow to accelerate. During a ground test run the engine is found to accelerate slower than it should. The engine is shut down and the cause is investigated so that the problem can be rectified.

Give THREE causes of this problem, with a rectification for each problem.

Indicate in your answer whether the causes and rectifications are for a piston engine or for a gas turbine engine. (3 × 2) (6)

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TOTAL: 100

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