higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

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NATIONAL CERTIFICATE

AIRCRAFT MAINTENANCE THEORY N3

(11041113)

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09:00–12:00

This question paper consists of 8 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. Keep questions and sub-sections of questions together.
6. Write neatly and legibly.

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SECTION A

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 (1.1–1.5) in the ANSWER BOOK.

1.1 Hardening as applied to mild steel is used to produce maximum hardness to make it more resistant to wear by abrasion. To achieve this, the steel is heated ...

A to 30°C above its critical point.
B to 30°C below its critical point.
C until it has a cherry red colour.

1.2 When riveting is done on aircraft skin, the layout of the rivets is of extreme importance. One of the aspects involved during the process includes ...

A the correct heat treatment of the metal before rivets are fitted.
B using of the correct flux before fitting the rivets.
C material, temper condition and strength of the rivets to be used.

1.3 When hydraulic tubing of an aircraft's main landing gear is inspected, it involves checking for leaks, cracks and particularly dents. When dents of deeper than 20% of tube diameter is found, the tube must be ...

A repaired by pressing the dent out.
B replaced with a new one.
C repaired by filling the dent and smoothing it.

1.4 The engine fuel system of a light piston aircraft must be inspected.

During the inspection the fuel filter will be inspected for ...

A corrosion, cracks and acceleration.
B sediment, slime and water.
C foreign particles, nicks and stretching.

1.5 When a magneto of a piston engine is overhauled, its magnet must be inspected for condition. During this process the magnet's magnetism is checked using a ...

A Gauss meter.
B Comparator.
C Dynamometer.

(5 × 1) **[5]**

QUESTION 2

2.1 During a flying control system inspection, a chain and sprocket attached to the cockpit controls need to be inspected.

What defects will be looked for on the chain and sprocket? (3)

2.2 On landing, a transport aircraft was flying through turbulence and was landed hard. After the landing, the aircraft must be inspected.

What would the landing gear's oleo legs and hydraulic jack rams be inspected for during this inspection? (3)

2.3 What type of instrument is the heading indicator? (2)

2.4 Explain what is illustrated in FIGURE 1 below and where it is found. (2)

FOR	000	030	060	090	120	150
STEER						
RDO. ON	001	032	062	095	123	155
RDO. OFF	002	031	064	094	125	157

FOR	180	210	240	270	300	330
STEER						
RDO. ON	176	210	243	271	296	325
RDO. OFF	174	210	240	273	298	327

FIGURE 1

2.5 During a routine inspection of the electrical system on an aircraft, the generators must be inspected to ensure proper functioning.

Describe what the generator is inspected for during this inspection. (3)

2.6 An aircraft's landing gear wheel ball or roller bearings are periodically removed and inspected for condition before being packed with a lubricant and installed on the rim.

What precautions need to be taken when the bearings are handled during the removal, cleaning, inspection, lubrication and installation? (4)

2.7 A blow-back valve is fitted to the flap control system to allow the flaps to be 'pushed' back (retracted) when the danger speed for the flaps is reached – when the force of the airflow due to high airspeed can cause damage to the flap control system.

What would this valve be inspected for during a routine flap control system inspection? (3)

[20]

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QUESTION 3

3.1 After engine overhaul, reassembly and testing, the engine is installed on the air frame mounting structure. Before the actual installation take place, the mounting structure and the engine itself is checked and inspected.

What would a piston engine be checked and inspected for before the installation procedure starts? (4)

3.2 The after-installation inspection is one of the most important inspections carried out on the engine before the engine can be tested and placed back, after overhaul. During this inspection the engine, controls, pipes and hoses, wiring and accessories are inspected.

What is the engine itself checked for during this all-important inspection? (3)

3.3 A ground-run test is usually performed on an engine following complete engine overhaul. At the end of the test the engine must be shut down correctly.

Describe this shutting down procedure of a piston engine OR a turbine engine. Make sure to mention which one you describe. (4)

3.4 High oil consumption has been detected on an aircraft gas turbine engine over consecutive flights and must be investigated and rectified.

What may cause the high oil consumption of this engine? (2)

3.5 Fuel lines on the engine are inspected during routine maintenance of the engine fuel system.

What would be looked for on the fuel lines during this inspection? (3)

3.6 When a routine inspection of the ignition system is done, either new spark plugs are fitted or the top and bottom spark plug are swapped.

Explain how the spark plugs should be installed. (3)

3.7 A piston engine's fuel injection system is inspected during a routine inspection. During this inspection, the injector nozzles of the system must be inspected.

What would be looked for during the inspection of the injector nozzles? (3)
[22]

TOTAL SECTION A: 47

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SECTION B: AIR FRAMES

QUESTION 4

4.1 A longeron repair is required after an accident on a light transport aircraft. FIGURE 2 below shows the portion of the longeron that is damaged.

Explain how this kind of repair can be done. (5)

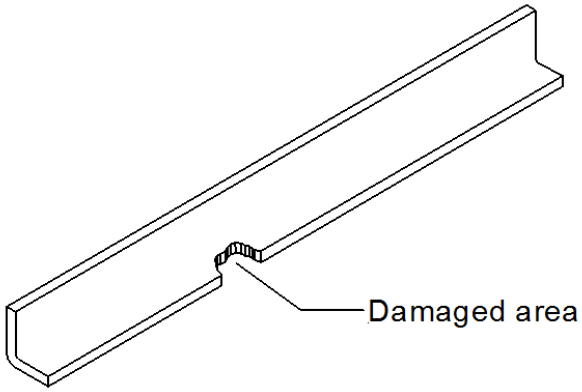


FIGURE 2

4.2 With reference to construction and repair of fabric-covered aircraft, what does *dope protection* mean? (2)

4.3 During symmetry check of an aircraft, it will be placed and levelled on jacks and then certain measurements will be taken.

What instruments and tools are required to accurately take these measurements? (2)

4.4 An oil cooler had been overhauled in the workshop. After completion of disassembly and cleaning, the cooler will go through an inspection to determine whether it is serviceable.

Give a summary of this inspection. (2)

4.5 After a landing gear shock absorber is overhauled, a functional test of the shock absorber is necessary.

Briefly explain how this test is completed. (4)

4.6 An elevator control cable has been replaced and the system must be tested for correct assembly and functioning.

Summarise the check and functional test required to ensure that the system is serviceable. (4)

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4.7 All the flying instruments must be checked on a regular basis for proper operation and accuracy.

Why is there a need to check the calibration of flying instruments? (2)

4.8 According to regulations and manufacturer's instructions, aircraft are regularly weighed and their centre of gravity determined.

Give a brief summary of how the empty weight of an aircraft is determined. (4)
[25]

TOTAL SECTION B: 25

SECTION C: ENGINES

QUESTION 5

5.1 Various non-destructive tests on engine components can be used to check for defects. Dangerous internal defects are usually more difficult to detect unless processes like the magnetic particle detection test is used.

How is this test applied? (8)

5.2 An overhaul is carried out on a gas turbine engine and the compressor, a centrifugal type, is removed for inspection in the workshop.

What, in general, would one of these be inspected for? (2)

5.3 An engine was installed on the air frame and the controls have to be checked for correct functioning.

What would this check consist of? (4)

5.4 When an aircraft engine is tested in a test cell, various pieces of equipment, controls and tools are required, including instruments to monitor and measure engine condition and performance.

Name THREE instruments that will possibly be found in the control station. (3)

5.5 A turboprop engine's propeller has been overhauled in the workshop. After reassembly, the propeller is functionally tested for correct operation of the pitch-changing mechanism that controls the angle at which the blades are set.

Summarize the check-up of the propeller after it is mounted on the testing stand and connected to the various systems for operation to test the control system of the blade-changing mechanisms. (4)

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5.6 After mounting a new turbo supercharger on a piston engine, a pre-run inspection and check is completed. A ground run will be carried out to test the functioning of the turbo supercharger.

Summarise the test that should be carried out during the ground run. (7)
[28]

TOTAL SECTION C: 28

GRAND TOTAL: 100

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