



**higher education  
& training**

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Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL CERTIFICATE**

**AIRCRAFT MAINTENANCE THEORY N1**

(11041091)

**8 April 2020 (X-paper)  
09:00–12:00**

**This question paper consists of 5 pages.**

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**DEPARTMENT OF HIGHER EDUCATION AND TRAINING**  
**REPUBLIC OF SOUTH AFRICA**  
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AIRCRAFT MAINTENANCE THEORY N1  
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. Write neatly and legibly.
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**QUESTION 1**

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.1–1.15) in the ANSWER BOOK.

- 1.1 A before-flight inspection must be done within eight hours before the aircraft's next flight. 
- 1.2 The illustrated parts catalogue provides instructions on how to repair structures on an aircraft.
- 1.3 The air pressure at high altitudes is less dense than the air pressure at lower altitude thus aircraft can fly more economical at high altitudes.
- 1.4 The empennage is a cone found on the front of the fuselage to which the horizontal stabilisers are attached.
- 1.5 Parasite drag is caused by any exposed object which offers resistance to airflow.
- 1.6 Surface corrosion is identified by powdery deposits on the surface of the components. 
- 1.7 In the semi-monocoque fuselage construction the skin carries all the primary stresses.
- 1.8 The colour of synthetic hydraulic oil is red.
- 1.9 The purpose of the standpipe in hydraulic reservoirs is to allow sufficient quantities of fluid for emergency purposes. 
- 1.10 The function of accumulators is to supply fluid under pressure to compensate for small external leaks.
- 1.11 The purpose of the fuel system is to supply dirty fuel to the fuel-control unit.
- 1.12 The purpose of the cyclic pitch control on helicopters is to tilt the tip-path plane of the rotor blade.
- 1.13 Inlet valve stems contain a salt that serves as a cooling agent.
- 1.14 The centrifugal flow compressor of a gas turbine engine consists of an impeller and a diffuser. 
- 1.15 Magnetos are fitted to all gas turbine engines.

(15 × 1) [15]

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**QUESTION 2**

2.1 Describe the following aircraft maintenance schedules:

2.1.1 Bulletins 

2.1.2 Maintenance manuals

2.1.3 Overhaul manuals

(3 × 2) (6)

2.2 Explain when, how and why a duplicate inspection is carried out. (6)

2.3 Make neat, labelled sketches to explain each of the following aircraft terms:

2.3.1 Angle of attack


2.3.2 Angle of incidence

2.3.3 Fineness ratio 

2.3.4 Aspect ratio

(4 × 2) (8)  
**[20]****QUESTION 3**

3.1 Define the following terms, with the aid of sketches:

3.1.1 Boundary layer 

3.1.2 Wing-tip vortices

(2 × 2) (4)

3.2 Name any THREE corrosion-prone areas on aircraft. (3)

3.3 Name THREE stresses that structural members are subjected to during flight. (3)  
**[10]****QUESTION 4**


Make neat, labelled sketches of the following components found in hydraulic systems:

4.1 Piston-type accumulator  (5)4.2 Double-acting hand pump (5)  
**[10]**

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**QUESTION 5**


- 5.1 Name FIVE basic components of an airframe fuel system. (5)
- 5.2 Make neat, labelled sketches of the following functions of helicopters:
- 5.2.1 Angle of attack  (5)
- 5.2.2 Axis of rotation
- 5.2.3 Disk area
- 5.2.4 Disk loading
- 5.2.5 Solidity ratio
- (5 × 2) (10)  
**[15]**

**QUESTION 6**

Make neat, labelled sketches of the following components of a reciprocating petrol engine:

- 6.1 Exhaust valve (indicate the cooling element) (3)
- 6.2 Recessed type piston head  (3)
- 6.3 Single-throw radial engine crankshaft (5)
- 6.4 Opposed or flat-type cylinder arrangement  (2)
- 6.5 Single row, radial type cylinder arrangement (2)  
**[15]**

**QUESTION 7**

- 7.1 Describe the FIVE sections of a single spool gas-turbine engine.  (5 × 2) (10)
- 7.2 Make neat, labelled sketches of THREE types of combustion chambers used on gas-turbine engines. (5)  
**[15]**

**TOTAL: 100**