higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

AIRCRAFT MAINTENANCE THEORY N2

2 AUGUST 2018

This marking guideline consists of 5 pages.

Copyright reserved

QUESTION 1

1.1 B
1.2 A
1.3 B
1.4 B
1.5 A

(5 × 1) **[5]**

QUESTION 2

2.1
- It produces more lift.
- It causes less drag.
- It provides extra thickness which is necessary for structural strength.

(Any 2 × 1) (2)

2.2 It is the curvature of the upper surface of an aerofoil.✓ The air has to accelerate over the aerofoil to develop lift.✓ Increasing the camber will increase the lift up to a point when the drag will become greater than the lift.✓ (3)

2.3 2.3.1
A Formers/frames/hoops/reinforcing rings
B Skin/stressed skin/covering
C Stringer/longeron
D Firewall/bulkhead (4)

2.3.2 Semi-monocoque fuselage construction (1)

2.4
- Move the controls to check the system for freedom of movement.
- Check for correct cable routing.
- Carry out a directional check to ensure that the control surface movement corresponds to cockpit control movement.
- Check the system for the correct static friction.
- Check the system for lost motion.
- Check the travel of the control surfaces for the correct amount of deflection.
- Check that the anti-balance tab or balance tab move correctly in relation to the control surface movement.

(Any 5 × 1) (5)

2.5 The process of tempering is applied to relieve the steel of brittleness✓ and induce toughness.✓ (2)

2.6 Stress corrosion is the result of the combined effect of sustained tensile stress✓ and a corrosive environment.✓ (2)

2.7
- If required, stop drill the crack.
- Prepare and install a supporting structure to strengthen the part.
- If the damage is beyond the required structural strength, replace the part. (3)

[22]

Copyright reserved

QUESTION 3

3.1
A Air valve assembly/Charging valve assembly
B Casing/Shell/Outer cover
C Inlet/Pressurised flow/Hydraulic fluid enter
D Bladder (4)

3.2 The regulator manages the output of the pump✓ to maintain system operating pressure within a predetermined range.✓ (2)

3.3 This drier is fitted to the system to protect it from malfunctioning✓ due to freezing✓ in the system under low-temperature conditions. (2)

3.4 They are the devices used to store air under pressure to feed the system when the demand exceeds the supply from the compressor.✓ It will also provide a limited amount of air for emergency use should the compressor or engine fail.✓ (2)

3.5 The purpose/function of the outflow valve is to vent cabin air✓ overboard through suitable openings✓ in the wing fillet or the fuselage skin. (2)

3.6 3.6.1
A Augmenter muff
B Augmenter/Engine exhaust heater
C Augmenter vane (3)

3.6.2 Hot exhaust gas flows through the exhaust pipes✓ and through the inner part of the heat exchanger✓and out to atmosphere through the exhaust pipe after leaving the heat exchanger.✓ Air that is used to cool the moderately heated engine is directed into the heat exchanger✓ where it takes up more heat from the warmer exhaust gas.✓ This air is then directed to the wing leading edges after leaving the heat exchanger.✓ (6)

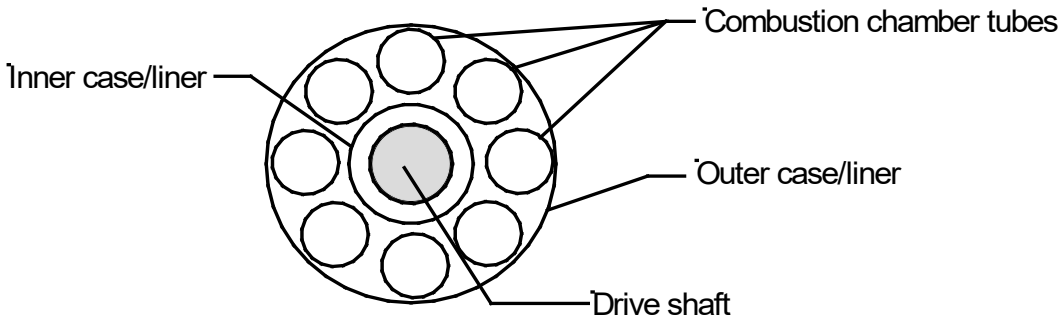
[21]

QUESTION 4

4.1 The main function is to provide space for the mounting of accessories necessary for operation and control of the engine.✓ It also include the systems necessary for starting,✓ lubrication,✓ fuel supply,✓ and auxiliary purposes such as anti-icing,✓ cooling✓ and pressurisation.✓ (7)

Copyright reserved

4.2



(1 × sketch + 2 × labelling) (3)

4.3
- The power section assembly, which contains the usual major components of gas turbine engines (compressor, combustion chamber, turbine, and exhaust sections).
- The reduction gear or gearbox assembly which contains those sections to drive the propeller and is peculiar to turboprop engines.
- The torque meter assembly, which transmits the torque from the engine to the gearbox of the reduction section.
- The accessory drive housing assembly. (4)

4.4 Pre-ignition in a spark-ignition engine describes the event where the air/fuel mixture in the cylinder ignites before the spark plug fires.✓ Pre-ignition is initiated by an ignition source other than the spark.✓ (2)

4.5 4.5.1
A Spark plug
B Injector
C Inlet valve (3)

4.5.2 The purpose of the fuel injector is to discharge/spray the atomised fuel✓ directly into the combustion chamber of the/each cylinder.✓ (2)

4.6
- Increase air pressure entering the carburettor
- Keeps the fuel/air ratio correct at high altitudes
- Power output can be maintained (= sea level) at higher altitudes (Any 1) (1)

4.7
- Single-stage with only one speed
- Single-stage two-speed with mechanical clutch
- Single-stage with variable speed hydraulic clutch
- Two-stage with mechanical clutch
- Two-stage with variable speed hydraulic clutch
- Two-stage, variable speed with aftercooler
- Turbo exhaust-driven with intercooler (Any 2 × 1) (2)

[24]

QUESTION 5

5.1 Think of a propeller as a spinning wing.✓ Like a wing, it produces lift, but in a forward direction – a force we refer to as thrust.✓ Its rotary motion through the air creates a difference in air pressure between the front and back surfaces of its blades.✓For a propeller blade to spin, it usually needs the help of an engine.✓ (4)

5.2 The indicated horsepower produced by an engine is the power calculated from the indicated mean effective pressure✓ and the other factors which affect the power output of an engine✓ whereas brake horsepower is the power delivered✓ to the propeller✓ for useful work. (4)

5.3
- With the engine warmed up and idling, move mixture control to the auto lean position.
- Advance throttle rapidly to accelerate the engine to the required rpm.
- Close throttle to bring the engine down to idle rpm.
- Move mixture control to auto rich position.
- Advance throttle rapidly to accelerate the engine to the required rpm.
- Close throttle to bring the engine down to idle rpm.
- The engine should accelerate without any tendency to backfire or to cut. (7)

5.4 5.4.1 Inspect for condition and security. (1)

5.4.2 Inspect for deterioration and breakage. (1)

5.4.3 Inspect for condition, mounting, marking and proper operation. (2)

[19]

QUESTION 6

6.1 As altitude increases, the absolute pressure and density decrease✓ and as a result the weight of the air entering the engine at any given time decreases.✓ Oxygen levels will thus also reduce in the same proportion.✓ This will result in a steady decrease in thrust as altitude increase.✓ (4)

6.2 The gyroplane is required to make a short run before take-off or during landing✓ (50 m plus), unless a fairly strong wind is blowing.✓
The helicopter can take-off and land vertically.✓ (3)

6.3 *Plane of rotation* or *tip path plane* is a plane formed by the path of the rotor blade tips; it is normal to the axis of rotation.✓✓ (2)

[9]

TOTAL: 100

Copyright reserved