higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

AIRCRAFT MAINTENANCE THEORY N3

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This marking guideline consists of 7 pages.

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QUESTION 1

1.1 B
1.2 A
1.3 A
1.4 A
1.5 C

(5 × 1) **[5]**

QUESTION 2

2.1
- Issuing an airworthiness certificate as laid down by the authorities
- Issuing a safety certificate as laid down by the authorities
- Ensuring the safety of the passengers and crew
- Declaring the aircraft serviceable at all times
- Restricting corrosion to an absolute minimum
- Ensuring that enough fuel is carried for the duration of the flight
- Determining of defects that could occur and the servicing of it
- Preventing defects from recurring (Any 4 × 1) (4)

2.2
- Surface wrinkling
- Liquid leakage along riveted seams (especially fuel)
- Difficulty to operate flying or engine controls
- Burst, damaged or excessively worn tyres
- Bow or leakage of oleo legs
- External evidence of damage on spar webs, bulkheads, nacelle skin and attachments, firewall skin and wing and fuselage stringers. (Any 4 × 1) (4)

2.3
- Remove paint, grease and dirt.
- Choose the correct film for the specific part in terms of
  - material thickness and density
  - shape and size
  - type of defect to be detected
  - exposure distance
  - exposure angle
- Complete testing under the correct light condition - film should not be readily sensitive to the light source.
- Place the film in a cartridge if it is not supplied with one.
- Place it directly under the position of the radiation beam.
- If it is a loose part to be checked place it on top the film cartridge.
- Select the current intensity.
- Adjust the timer for the correct period of exposure.
- Press the start button.
- Remove the film and process it in a dark room (some automatic processing units is available).
- Inspect the film for evidence of cracks. (Any 10 × 1) (10)

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2.4 To relieve brittleness, induce toughness and still retain hardness (1)

2.5
- Heat the steel to just below its critical point.
- Cool at room temperature by means of air until the right temperature is reached.
- Quench the steel in cold water, oil or brine. (3)

[22]

QUESTION 3

3.1 It may cause paint blistering, discolouration, powdery deposits, pitting, thinning, roughening, exfoliation and flaking of the surface. If left untreated weakening of the metal will result and eventually failure. Change the smooth surface, weaken the interior and loosen adjacent parts. (Any 3 × 1) (3)

3.2
- Seam should be smooth and of uniform thickness
- Weld should be built up to provide extra thickness at the seam
- Weld metal should taper off smoothly into the base metal.
- No oxide should form on the base metal at a distance of more than ±12 mm from the weld
- Metal should show no signs of any of the following:
  - pitting
  - burning
  - cracking
  - distortion
- Weld should show no signs of any of the following:
  - blowholes
  - porosity
  - projecting globules (Any 6 × 1) (6)

3.3.1 A – Dihedral angle check
B – Fin verticality check (2)

3.3.2 Dihedral board (1)

3.3.3
- The dihedral angle should be checked by using the dihedral boards specified for the aircraft type provided by the manufacturer.
- On certain aeroplanes the main planes' dihedral must be checked in more than one position and will therefore have more than one board and position to check.
- Place the boards on the wings and horizontal stabilisers in the positions specified in the maintenance manual which is usually on one of the spars.
- Check that the bubble of the spirit levels is central. (4)

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3.4
- Increased fuel consumption
- Increased power for any given speed
- Increased tendency to dive, especially with power off
- Increased difficulty in raising the nose of the aircraft when landing
- Increased oscillation tendency
- Increased stresses on the nose wheel
- Increased danger during flap operation
- Development of dangerous spin characteristics
- Decrease in stability
- Directional instability on the ground because of the manner of using brakes
- Increased danger if the tail assembly is damaged
- Danger of going into a dive when power is cut off for landing (Any 6 × 1) (6)

[22]

QUESTION 4

4.1.1 Altimeter (1)

4.1.2
- Check the condition of the instrument.
- Connect the test instrument to the static vent by means of the appropriate adapter.
- Switch the selector valve on the test instrument to “suction to static”
- Apply vacuum by slowly extracting the lever of the test instrument pump.
- Check that the altitude increase as the suction is applied and stops dead when the suction is seized
- Check that the pointer movement is smooth and even (5)

4.2
- Carry out operational check of the following electrically driven equipment:
  - Motors
  - Inverters
  - Generators
  - Alternators
- Carry out a voltage check of the system with a precision voltmeter.
- Carry out all major adjustments to the following equipment:
  - Regulators
  - Generators or alternators
  - Contactors
  - Inverters
  - Relays
- Adjustments must be carried out on a test bench having all the necessary equipment and instruments at hand.
- Complete a ground run.
- Carry out final inspection
- Complete paperwork (Any 4 × 1) (4)

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4.3
- Move the controls to check the system for freedom of movement.
- Check for correct cable routing.
- Carry out a directional check to check 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 moves correctly in relation to control movement. (Any 5 × 1) (5)

4.4
- Ensure that the vents are clear.
- Ensure that the pressure gauges are serviceable.
- Ensure that all parts of the system to be tested are interconnected.
- Apply the tests stage by stage to assist in tracing defects.
- Apply the pneumatic pressure slowly.
- Fit the necessary blank-offs.
- Keep a fire extinguisher nearby. (Any 4 × 1) (4)

4.5 The setting of a point or line (as in time, space, speed or degree) beyond which something cannot or is not permitted to go

OR

A restriction on the size or amount of something permissible or possible (2)

4.6 Check for the following:
- Evidence of oil leaks oil - seepage should be tracked to its source
- Obvious cracks
- Evidence of blown joints at cylinder heads
- Local seepage of gas or liquids (4)

[25]

QUESTION 5

5.1 Check for the following:
- Cracks
- Corrosion
- Signs of leakage
- Abrasion
- Stripped threads of retaining screw, nuts and studs (Any 2 × 1) (2)

5.2 Check for the following:
- Metal particles in the filter unit
- Correct functioning of bypass valve
- Leakage
- Cracks
- Cleaning or replacement of filter element if required (Any 3 × 1) (3)

5.3 Check braid/conduit for the following:
- Overheating
- Excessive play
- Adequate support throughout its length
- Correct routing
- Twisting
- Excessive bending
- Loose clamps
- Chafing
- Fluid contamination (Any 3 × 1) (3)

5.4 Check the propeller dome for the following:
- Wear
- Cracks
- Corrosion
- Overheating
- Nicks
- Scratches
- Dents
- Distortion (Any 3 × 1) (3)

5.5
- After complete engine overhaul
- After partial engine overhaul
- To trace and verify certain defects before stripping
- To check engine condition (4)

5.6 **PISTON ENGINE**

CAUSE	RECTIFICATION
Propeller damaged	Replace propeller
Propeller loose	Tighten propeller mounting bolts
Engine misfiring	Adjust fuel mixture, check ignition system for correct functioning. Reset timing, replace magneto, ignition wiring or spark plugs.
Overheating	Repair as outlined in description under overheating
Incorrect grade of fuel	Fill tank with recommended grade
Damaged main journals and bearings	Overhaul engine

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GAS TURBINE ENGINE

CAUSE	RECTIFICATION
Damaged compressor assembly	Inspect the compressor with a strong inspection light for damage. Repair any damage or replace the damaged parts.
Damaged turbine assembly	Inspect the turbines with a strong inspection light for damage. Repair any damage or replace the damaged parts.
Turbine assembly unbalanced	Remove and rebalance turbine assembly.
Compressor assembly unbalanced	Remove and rebalance compressor assembly.
Defective engine mounted accessory such as constant speed drive, generator, hydraulic pump, etc.	Check each component in turn and repair or replace the defective component.
Instrumentation pickups malfunctioning	Replace pickups.

(2 × 3) (6)

5.7
- Corrosion
- Pitting of the races, balls or rollers
- Cracks
- Scores
- Excessive radial or axial movement of the inner race relative to the outer race
- Fretting marks
- Tool marks

(Any 5 × 1) (5)
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TOTAL: 100

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