higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

AIRCRAFT MAINTENANCE THEORY N1

(11041102)

27 November 2023 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 7 pages.

327Q1E2327

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
AIRCRAFT MAINTENANCE THEORY N1
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. Start each question on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 ... is produced by the power plant of an aircraft.

A Gravity
B Drag
C Lift
D Thrust

1.1.2 The purpose of the reservoir in an aircraft hydraulic system is mainly to …

A limit the amount of pressure being exerted on confined liquid.
B convert mechanical energy into fluid pressure energy.
C store the supply of hydraulic fluid.
D absorb the moisture from the air.

1.1.3 Conventional aircraft fuel tanks are usually made of …

A plastics, copper and stainless steel sheet metal.
B aluminium alloy, terne plates or stainless steel sheet metal.
C silicone, epoxy and polyester resins.
D bronze, brass and white metal.

1.1.4 The … is the angle between the chord line of the rotor and the relative airflow.

A pitch angle
B angle of attack
C blade angle
D angle of incidence

1.1.5 A plunger that moves back and forth within an engine cylinder barrel:

A Connecting rod
B Pistons
C Valves
D Crankcase

(5 × 1) (5)

1.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

1.2.1 During the intake stroke, the intake valve is open and the exhaust valve is closed.

1.2.2 A turboprop engine is a combination of a gas turbine and a propeller.

1.2.3 Primary inspections must be carried out after periods of flying hours have been completed.

1.2.4 Altitude supercharged engines cannot be opened to full throttle at sea level without doing some damage to the engine.

1.2.5 A lubricant reduces friction between moving parts and also helps to cool the engine.

(5 × 1) (5)

1.3 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–H) next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.3.1	Angle between the chord line and the relative airflow	A	vanadium steel
1.3.2	Promotes resistance to fatigue	B	tension
1.3.3	Stress that tends to crush a material together	C	blade angle
1.3.4	Indicates the amount of hydraulic pressure in a system	D	angle of attack
1.3.5	Can take off, climb and land vertically	E	chrome steel
		F	compression
		G	pressure gauge
		H	helicopter

(5 × 1) (5)

1.4 Complete the following sentences by choosing a word or words from the list below. Write only the answer next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.

turbine engine; stress; disk area; blade angle; angle of incidence; galvanic; intergranular; pistons; valve

1.4.1 A … is a device that determines the direction of flow of a liquid.

1.4.2 The … is the angle formed between the chord line and a horizontal reference line when the aircraft is in rigging position.

1.4.3 … corrosion has the same appearance as surface corrosion.

1.4.4 Torsion is the … where the forces applied causes a twisting action on the material.

1.4.5 Disk loading is the ratio of the rotorcraft weight to the ...

(5 × 1) (5)
[20]

TOTAL SECTION A: 20

SECTION B

QUESTION 2

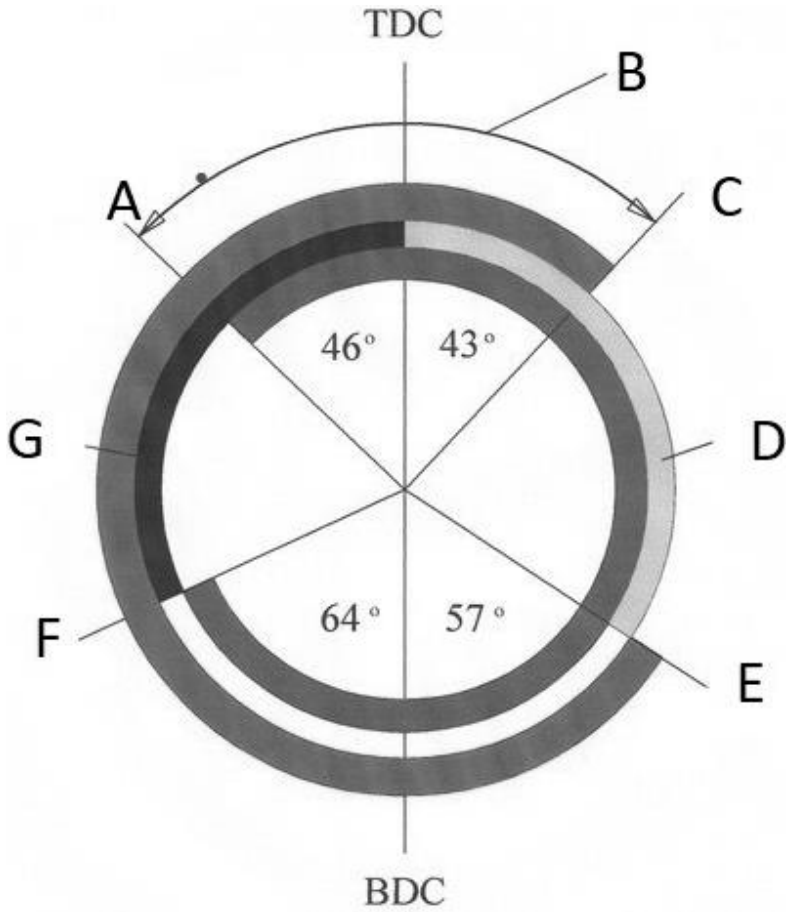
2.1 Define the term *boundary layer*. (2)

2.2 Make neat, labelled sketches of the aspect and fineness ratio of an aircraft main wing. (6)

2.3 List 12 components used in the hydraulic system of an aircraft. (12)
[20]

QUESTION 3

3.1



Label the parts of the petrol engine valve timing diagram shown above by writing only the answer next to the letter (A-G) in the ANSWER BOOK. (7 × 1) (7)

3.2 Discuss the four-stroke cycle of a piston engine. (4 × 2) (8)

3.3 Name FIVE types of stresses an aircraft's structural members are subjected to during a flight. (5)
[20]

QUESTION 4

4.1 Give SIX advantages of monocoque and THREE disadvantages of semimonocoque construction in an aircraft. (6 + 3) (9)

4.2 Explain FIVE differences between a *gyroplane* and a *helicopter*. (5 + 5) (10)

4.3 Define the term *disc area*. (1)

[20]

QUESTION 5

5.1 List SEVEN parts of a carburettor. (7)

5.2 State FIVE safety precautions to follow when working in or on aircraft fuel tanks. (5)

5.3 Make a neat, labelled sketch of a centrifugal flow compressor. (8)

[20]

TOTAL SECTION B: 80
GRAND TOTAL: 100