higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

AIRCRAFT MAINTENANCE THEORY N2

(11041102)

4 December 2023 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 7 pages.

229Q1G2304

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
AIRCRAFT MAINTENANCE THEORY N2
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 section on a new page.
5. Use only black or blue pen.
6. Write neatly and legibly.

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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–C) next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 … is any line used to connect two points on a curve and is used to measure the distance between two points.

A Chord line
B Flap
C Chord

1.1.2 The movement of the blades in a horizontal plane is …

A lead.
B dragging.
C lag.

1.1.3 The angle between the longitudinal axis of the rotor blade and the tip path plane is …

A angle of pitch.
B coning angle.
C angle of attack.

1.1.4 … is the stress that tends to crush a material.

A Compression
B Tension
C Torsion

1.1.5 The degree of resistance of an oil to flow indicates its …

A flashpoint.
B viscosity.
C viscosity index.

(5 × 1) (5)

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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. Give ONE reason for each answer.

1.2.1 A good oil must show a high degree of chemical stability in order to resist the action of high temperature, moisture and acids.

1.2.2 A pressure relief valve is used to limit the amount of pressure being exerted on a confined liquid.

1.2.3 A compressor is a source of energy in an aircraft pneumatic system.

1.2.4 Indicated power is the power developed in the combustion chamber without reference to friction losses within the engine.

1.2.5 The purpose of reversible pitch propellers is to produce a high negative thrust at low speed by using engine power.

(5 × 1) (5)

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

COLUMN A		COLUMN B	
1.3.1	The shape of the cross section of a wing of an aircraft	A	accumulators
1.3.2	Store hydraulic fluid under pressure	B	helicopter
1.3.3	Has no propeller for producing forward thrust	C	thickness
1.3.4	The greatest distance between the upper and lower surfaces of the aerofoil	D	gyroplane
1.3.5	Supercharged engines that can be opened to full throttle at sea level	E	ground boosted engines
		F	aerofoil
		G	altitude supercharged engines

(5 × 1) (5)

1.4 Complete the following sentences by using the words provided in the list below. Write only the word(s) next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.

pitch angle; plane of rotation; viscosity index; flash point; volatile; supercharged engines; compression; angle of attack

1.4.1 The angle between the chord line of the rotor blade and the relative airflow.

1.4.2 Stress that tends to crush or press a material together.

1.4.3 A measure of the rate of change of viscosity.

1.4.4 A measure of the tendency of a liquid substance to vaporise under given conditions.

1.4..5 The angle between the chord line of the rotor blade and a plane normal to the drive shaft.

(5 × 1) (5)
[20]

TOTAL SECTION A: 20

SECTION B

QUESTION 2

2.1 Define the term, *angle of attack*. (2)

2.2 Describe, with the aid of a neat sketch, how lift is generated on an aircraft wing. (7)

2.3 Explain how a fixed-wing aircraft is controlled about its vertical axis during flight. (6)

2.4 When an aircraft is designed, the loads which are likely to be applied to parts of the aircraft during operation are carefully computed and analysed by engineers.

List FIVE types of stresses (the load that a material must bear) to which an aircraft's structural members are subjected during flight. (5 × 1) (5)
[20]

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QUESTION 3

3.1 Mention 10 areas sensitive to the formation of ice on an aircraft fuselage. (10)

3.2 Give FOUR types of pumping mechanisms used in hydraulic pumps. (4)

3.3 FIGURE 1 below shows a hydraulic gear-type power pump. Label the different parts indicated by writing only the answer next to the letter (A–F) in the ANSWER BOOK.

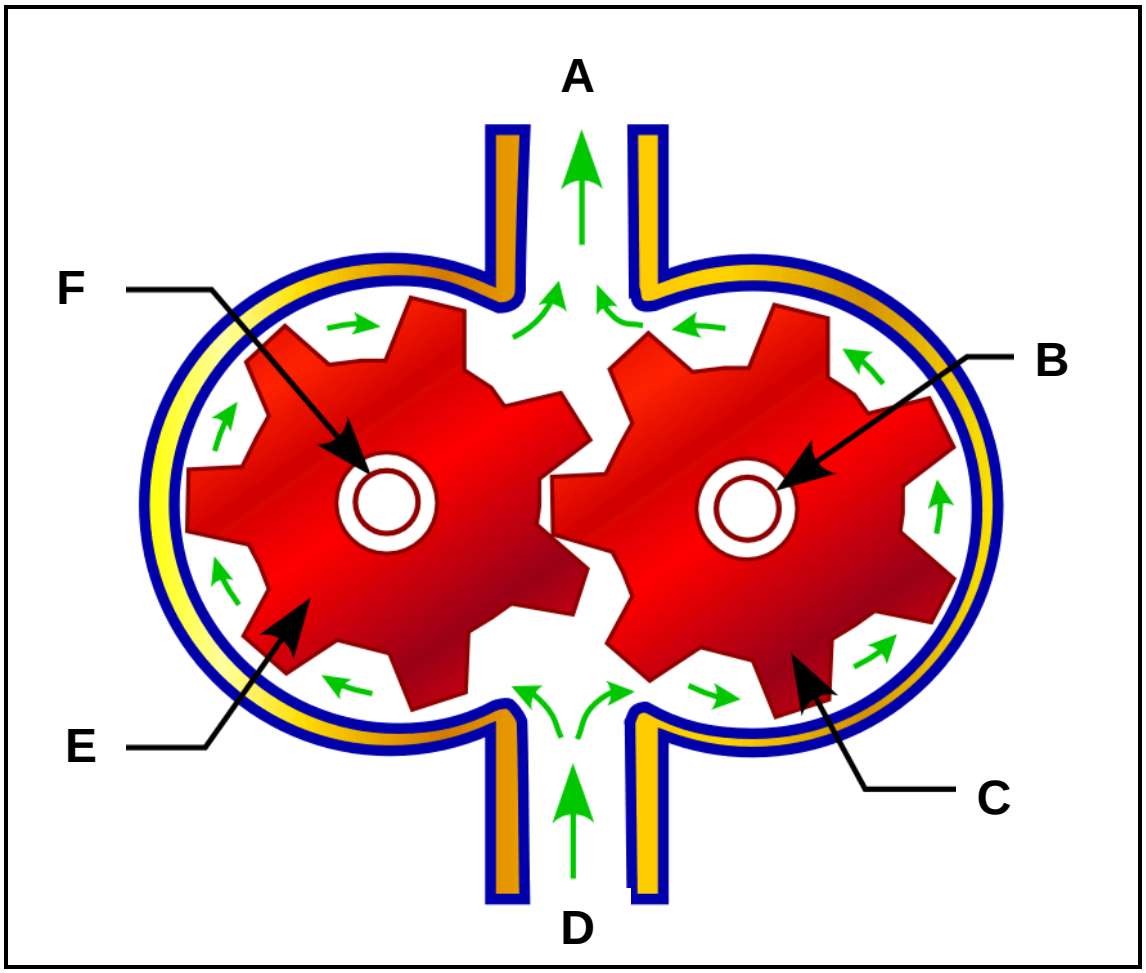

FIGURE 1

(6 × 1) (6)

[20]

QUESTION 4

4.1 Make a neat, labelled sketch of a vane type pressure pump. (10)

4.2 Give FIVE disadvantages of axial flow compressors in a gas turbine. (5)

4.3 Mention FIVE factors that cause detonation. (5)

[20]

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QUESTION 5

5.1	Name the FOUR stokes of a four-stroke Otto cycle and indicate how the piston moves for each stroke.	(8)
5.2	Discuss the differences between a *gyroplane* and a *helicopter* with regard to the appearance of each.	(6)
5.3	Define the term, *viscosity*.	(2)
5.4	Name FOUR components of a hydromatic propeller.	(4)
		[20]

TOTAL SECTION B: 80
GRAND TOTAL: 100

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