higher education & training

Department:
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REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

AIRCRAFT MAINTENANCE THEORY N2

(11041102)

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This question paper consists of 5 pages.

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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 question on a new page.
5. Use only a black or blue pen.
6. Drawings must be done in pencil and should be large enough to show all details.
7. Drawings must be properly labelled on the drawing and be legible.
8. Write neatly and legibly.

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QUESTION 1

1.1 Make a neat labelled drawing of an aerofoil at its stalling angle, showing the distribution of air over the aerofoil at that angle. Also show the position of the centre of pressure on the wing at the same angle. (5)

1.2 Refer to the figure below below and explain which of the two aerofoils A or B will produce more lift and why.

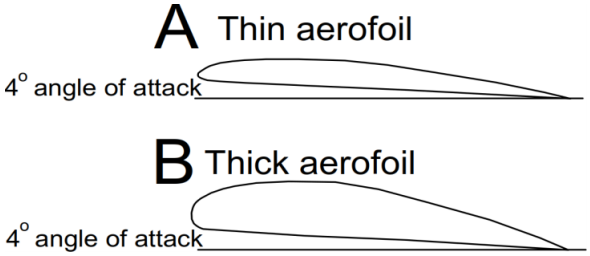

FIGURE (4)

1.3 Describe how wing-tip vortices are formed on a general aircraft aerofoil. (5)

1.4 Explain what is meant when referring to the following structural components on semi-monocoque aircraft structures:

1.4.1 Longeron

1.4.2 Stringer

(2 × 2) (4)

1.5 Make a neat labelled drawing of a scarf repair as done on aircraft structures as a method of repairing damage. (5)

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QUESTION 2

2.1 2.1.1 State the function of a double-action actuating cylinder. (1)

2.1.2 Describe the operation of the cylinder mentioned in QUESTION 2.1.1. (3)

2.2 State the purpose of a heat exchanger found on many aircraft heating systems. (2)

2.3 What is the function of an outflow valve used in the air-conditioning system of an aircraft? (2)

2.4 Explain the purpose of pressurising an aircraft's structure. (2)

2.5 Name the TWO datum planes that are used to assist in levelling and doing rigging checks on some aircraft. (2)

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2.6 Describe the check done on an aircraft during rigging checks to verify the verticality of the fin (vertical stabiliser). (3)

2.7 Name TWO checks that is required after flying control system rigging has been completed. (2)

2.8 State THREE faults that may cause an aircraft to fly with one wing low. (3)
[20]

QUESTION 3

3.1 What is the required temperature for heat treating aluminium alloys to apply the following processes?

3.1.1 Annealing

3.1.2 Normalising

(2 × 1) (2)

3.2 Briefly describe FOUR methods that can be used to protect metals against corrosion. (4)

3.3 Name TWO types of attack that can be found on rubber products that can cause deterioration of rubber. (2)

3.4 Explain the purpose of adding lead to aviation piston engine fuels. (2)

3.5 Jet engine fuels differ from piston engine fuels for various reasons.

Name TWO of the requirements of jet engine fuels. (2)

3.6 3.6.1 Explain why viscosity of an aircraft lubricant is important. (4)

3.6.2 Explain the effect it will have on the engine if the viscosity is either too low or too high. (2)

3.7 What is the function of a venturi in the float type carburettor of an aircraft piston engine? (2)
[20]

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QUESTION 4

4.1 Explain TWO methods that can be used to drive boost systems (superchargers and turbochargers) on aircraft piston engines. (4)

4.2 Answer the following with reference to variable pitch propellers:

4.2.1 Give a brief explanation of the meaning of variable pitch propellers. (1)

4.2.2 Name THREE advantages it has over the conventional fixed pitch propeller. (3)

4.3 Distinguish between *indicated horse power* (IHP) and *brake horse power* (BHP). (2)

4.4 Explain the starting procedure of an aircraft engine. (Indicate whether it is the procedure for a piston or gas turbine engine.) (6)

4.5 Briefly describe the inspection of the interior of the cockpit and cabin during a minor aircraft inspection. (4)
[20]

QUESTION 5

5.1 What effect does altitude have on a gas turbine engine's thrust output? (3)

5.2 With reference to the common gas turbine engine, answer the following questions:

5.2.1 Name FOUR parts the combustion chamber consist of. (4)

5.2.2 Make a neat labelled drawing to illustrate the combustion chamber. (4)

5.3 Compare the appearance of the *helicopter* and *gyro plane (auto gyro)* to distinguish between the two craft. (2)

5.4 Explain the function of the main rotor gearbox of a helicopter. (2)

5.5 Define the term *coning angle* with reference to rotorcraft. (2)
[17]

TOTAL: 100

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