

2506/201

**AIRCRAFT PROPELLER
SYSTEMS**

June/July 2019

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

**DIPLOMA IN AERONAUTICAL ENGINEERING
(AIRFRAME AND ENGINES OPTION)**

MODULE II

AIRCRAFT PROPELLER SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments;

Mathematical tables/ Non-programmable scientific calculator.

This paper consists of EIGHT questions.

Answer FIVE questions in the answer booklet provided.

Maximum marks for each part of a question are as indicated.

Candidates should answer the questions in English.

This paper consists of 2 printed pages.

Candidates should check the question paper to ascertain that both pages are printed as indicated and that no questions are missing.

1. (a) Explain why blade tip speed is considered during propeller blade design. (9 marks)
- (b) Describe the operation of a variable pitch propeller. (11 marks)
2. (a) Highlight the procedure of fitting a single blade on a fixed pitch propeller. (16 marks)
- (b) Highlight **four** ground tests carried out on a propeller system following a component change. (4 marks)
3. (a) With reference to wooden propellers blade construction:
- (i) state **four** materials used;
- (ii) describe the construction process. (15 marks)
- (b) Describe the construction of aircraft metal propellers. (5 marks)
4. With the aid of a labelled sketch, describe a typical electrical anti-icing system for aircraft propeller blades. (20 marks)
5. (a) Explain the function of a propeller control unit. (2 marks)
- (b) With the aid of a labelled diagram, describe the **four** main assemblies of an engine driven propeller control unit. (18 marks)
6. With the aid of labelled sketches, describe the construction and operation of an electronic propeller torque meter. (20 marks)
7. In accordance with the J.A.R'S, explain each of the following guidelines with respect to metallic propeller materials and processes:
- (a) selection; (6 marks)
- (b) material specifications; (3 marks)
- (c) design values; (2 marks)
- (d) process specifications; (3 marks)
- (e) special manufacturing methods. (6 marks)
8. (a) With the aid of labelled sketches, describe the blade repair limitations for each of the following:
- (i) face and camber repairs; (9 marks)
- (ii) leading and trailing ledge repairs. (9 marks)
- (b) State **four** contents of a blade minor kit used in line maintenance. (2 marks)

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