2506/201
AIRCRAFT PROPELLER SYSTEMS
Oct./Nov. 2019
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AURONAUTICAL ENGINEERING (AIRFRAMES AND ENGINES OPTION)

AIRCRAFT PROPELLER SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Mathematical tables/Non programmable calculators;
Drawing instruments.
*This paper consists of **EIGHT** questions.*
*Answer **FIVE** questions.*
All questions carry equal marks.
Maximum marks for each part of a question are as indicated.
Candidates should answer the questions in English.

This paper consists of 3 printed pages.

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

1. (a) Discuss how a propeller blade achieves its function. (15 marks)

(b) With the aid of a labelled sketch, show stations 8, 12 and 14 on a 30 inch blade. (5 marks)

2. (a) Highlight the general procedure of blending out damage on a propeller blade. (14 marks)

(b) Outline the procedure of checking and repairing a bent propeller blade. (6 marks)

3. With reference to a typical fluid de-icing system for aircraft propeller blades, describe each of the following using a labelled sketch:

(a) construction; (9 marks)

(b) operation; (6 marks)

(c) functional test. (5 marks)

4. (a) With the aid of a labelled sketch, describe the pitch change mechanism of a counterweight propeller. (11 marks)

(b) Explain **two** methods of achieving feathering operation for an aircraft in flight. (9 marks)

5. (a) Describe **three** types of balancing carried out on aircraft propeller blades. (13 marks)

(b) Explain the importance of each of the following with reference to propeller balancing:

(i) propeller track;
(ii) propeller visibility.

(5 marks)

(c) Explain **two** reasons for balancing propeller blades. (2 marks)

6. Outline the propeller monitoring checks that form part of the normal "after start" and "before take off" checks. (20 marks)

7. (a) Highlight the procedure for carrying out a flight test to fully evaluate an aircraft propeller vibration characteristics in accordance with JAR's. (9 marks)

(b) With reference, to propeller installation regulations, highlight the instructions that must be approved by the Authority and be provided by applicant. (6 marks)

(c) Explain how each of the following definitions apply to the propeller certification guidance provided in regulations:

(i) conventional;
(ii) feather;
(iii) flight role;
(iv) ground idle;
(v) normal operation.

(5 marks)

8. Explain the safety analysis considered on propeller systems in order to assess the likely consequences of all failures that can be reasonably expected to occur. (20 marks)

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