

2506/201
AIRCRAFT PROPELLER
SYSTEMS
June/July 2023
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.

This paper consists of EIGHT questions.

Answer FIVE of the EIGHT questions in the answer booklet provided.

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

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) With the aid of a labelled sketch, explain the forces on an aircraft propeller blade element. (10 marks)
- (b) Explain **five** factors which increase the ability of a propeller to absorb power giving **one** limitation of each. (10 marks)
2. With the aid of sketches, explain the forces that act on a propeller in flight. (20 marks)
3. (a) Outline **ten** major repairs and **six** alterations done on a propeller. (16 marks)
- (b) Explain **four** effects of major 'repair and alteration' on the propeller. (4 marks)
4. (a) Highlight the typical procedure for performing propeller blade tracking. (5 marks)
- (b) Explain the inspections done on each of the following types of propellers:
 - (i) fixed pitch; (4 marks)
 - (ii) controllable pitch. (11 marks)
5. With the aid of a labelled schematic sketch, describe the operation of an electrothermal propeller de-icing system. (20 marks)
6. With the aid of a labelled sketch, describe the construction and operation of a two-piston controllable pitch propeller. (20 marks)
7. With the aid of labelled sketches, describe the construction of each of the following types of composite propeller blades:
 - (a) Hartzell; (7 marks)
 - (b) Hamilton standard; (6 marks)
 - (c) Dowty rotol. (7 marks)
8. (a) With reference to JAR part - 35 - unworthiness standards, highlight the following:
 - (i) instructions for installing the propellers; (5 marks)
 - (ii) propeller ratings and operating limitations; (5 marks)
 - (iii) propeller critical part identified by the safety analysis. (3 marks)
- (b) With reference to JAR, highlight what is regarded to as hazardous propeller effects. (7 marks)

THIS IS THE LAST PRINTED PAGE.