

2506/201
AIRCRAFT PROPELLER
SYSTEMS
June/July 2022
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 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) With the aid of a labelled circuit diagram, explain a typical built-in auto feather safety system. (13 marks)
- (b) Explain a relight in flight, when the propeller is feathered. (7 marks)
2. With reference to aircraft propellers:
 - (a) sketch to show the blade interaction for a four engine aircraft with and without synchrophasing; (2 marks)
 - (b) describe synchrophasing; (4 marks)
 - (c) explain how it is achieved on modern aircrafts; (5 marks)
 - (d) describe beta control. (9 marks)
3. (a) Outline **eight** fault indications that would necessitate a propeller removal. (8 marks)
- (b) Discuss the typical propeller tracking inspection. (12 marks)
4. (a) With reference to turbo propeller engine, highlight:
 - (i) **seven** pre-starting precautions; (7 marks)
 - (ii) the starting procedure. (11 marks)
- (b) Explain propeller track and its effect. (2 marks)
5. (a) Explain each of the following with reference to propellers:
 - (i) effect of tip speed;
 - (ii) propeller efficiency. (6 marks)
- (b) With the aid of a labelled sketch, discuss propeller assymmetric loading on a twin engine aircraft. (14 marks)
6. With the aid of labelled sketches, describe the construction and principle of operation of an aircraft propeller governor. (20 marks)
7. (a) (i) State **six** turbine engine monitoring instruments;
- (ii) Explain the function of each of the instruments in (i). (9 marks)

- (b) Outline the precautions to be observed when starting an aircraft engine by hand cranking the propeller. (11 marks)
8. With the reference to KCAR's:
- (a) outline **seven** functions of an AMO with reference to maintenance of class 2 propellers; (9 marks)
- (b) with reference to FAR regulations:
- (i) outline **four** failures that result in excessive propeller imbalance; (4 marks)
- (ii) highlight **seven** elements of an acceptable safety assessment analysis. (7 marks)

THIS IS THE LAST PRINTED PAGE.