

2506/201

AIRCRAFT PROPELLER SYSTEMS

Oct./Nov. 2018

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL  
DIPLOMA IN AERONAUTICAL ENGINEERING  
MODULE II

AIRCRAFT PROPELLER SYSTEM

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** 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) Outline **five** maintenance logbook entries after inspection of a propeller system. (4 marks)
- (b) Discuss each of the following NDI methods on propeller systems:
- (i) visual;
  - (ii) penetrant;
  - (iii) ultrasonic;
  - (iv) eddy.

2. (a) Outline **five** effects of propeller icing on aircraft performance. *Weight Aerodynamic imbalance Dynamic imbalance* (5 marks) (16 marks)
- (b) With the aid of a labelled schematic diagram, explain the operation of electrothermal propeller de-icing system. (15 marks)

3. (a) Differentiate between pusher and tractor propeller, stating **one** advantage of each. (6 marks)
- (b) Describe each of the following types of propellers:
- (i) fixed pitch;
  - (ii) ground adjustable;
  - (iii) feathering;
  - (iv) reversible.
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- (14 marks)

4. (a) Explain **five** methods used to control the blade angle on a constant speed propeller. (5 marks)
- (b) With the aid of a labelled sketch, describe propeller pitch for an aircraft in flight. (10 marks)
- (c) Explain the propeller momentum theory. (5 marks)

5. (a) Highlight the procedure of performing propeller blade tracking. (6 marks)
- (b) Discuss the process of setting up a propeller governor of various engine R.P.M during maintenance. (6 marks)
- (c) Highlight the procedure for removal and installation of a typical propeller during maintenance. (8 marks)

6. (a) With the aid of a labelled cross-section diagram, describe the construction of a composite propeller blade. (11 marks)
- (b) With the aid of a labelled sketch, describe the construction of a wooden propeller. (9 marks)



7. (a) Explain each of the following terms as applied to propeller theory:

- (i) angle of incidence;
- (ii) angle of attack;
- (iii) climb or descent angle;
- (iv) pitch movement.

(4 marks)

(b) Discuss how each of the following factors affects the performance of a propeller driven aircraft:

- (i) torque;
- (ii) slip stream;
- (iii) blade asymmetry;
- (iv) gyroscopy.

8. With the aid of a labelled sketch:

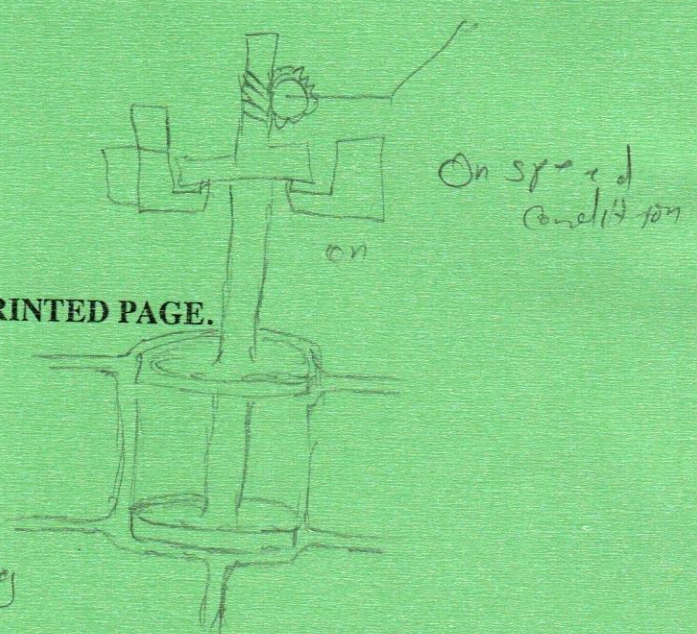
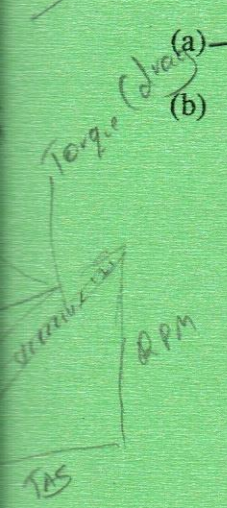
(16 marks)

(a) show the construction of a universal propeller protractor;

(7 marks)

(b) describe the construction of propeller governor.

(13 marks)



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