

2506/201

AIRCRAFT PROPELLER SYSTEMS

June/July 2017

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING  
(AIRFRAMES 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** questions in the answer booklet provided.*

*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. With the aid of labelled sketches:
- (a) show the cross-section of a propeller blade element; (5 marks)
  - (b) explain each of the forces that act on a rotating propeller. (15 marks)
- 2.
- (a) List **four** effects of ice formation on propeller blades. (4 marks)
  - (b) With the aid of a labelled sketch, explain the operation of a propeller anti-icing system. (16 marks)
3. With reference to propeller maintenance:
- (a)
    - (i) differentiate between hunting and surging;
    - (ii) outline **three** areas to check if the propeller is hunting;
    - (iii) highlight **three** areas to inspect if the propeller fails to feather. (8 marks)
  - (b)
    - (i) Describe propeller dynamic unbalance.
    - (ii) Highlight the procedure of conducting propeller dynamic balancing. (12 marks)
- 4.
- (a) Explain **five** methods used to control the blade angle of a constant speed propeller. (5 marks)
  - (b) With the aid of sketches, show **five** propeller blade positions with the respective blade angle ranges in degrees for each. (15 marks)
5. Explain how the propeller governor operates under each of the following conditions:
- (a) underspeed; (10 marks)
  - (b) overspeed. (10 marks)
- 6.
- (a) Highlight the procedure of propeller blade tracking. (5 marks)
  - (b) With the aid of a labelled diagram, explain the operation of a typical twin engine propeller synchrophasing system. (15 marks)

7. Discuss the inspection checks for each of the following types of propellers:
- (a) Wooden; (5 marks)
  - (b) Aluminium; (5 marks)
  - (c) Composite; (5 marks)
  - (d) Metal. (5 marks)
8. Highlight the procedure for:
- (a) installing a propeller blade; (8 marks)
  - (b) checking the propeller blade angle using a universal propeller protractor. (12 marks)

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