

2506/201  
AIRCRAFT PROPELLER SYSTEMS  
June/July 2018  
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.*

*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, explain the forces that act on a propeller in flight. (20 marks)
2. (a) With the aid of a sketch, explain the blade element theory. (7 marks)
- (b) With the aid of labelled sketches, explain the relationship between propeller blade pitch angle and angle of attack for each of the following:
- (i) zero speed;
  - (ii) low speed;
  - (iii) high speed;
  - (iv) increased R.P.M.
- (8 marks)
- (c) With reference to propeller blade section, show the following:
- (i) blade angle;
  - (ii) axis of rotation;
  - (iii) plane of rotation;
  - (iv) blade face.
- (5 marks)
3. With the aid of sketches, describe the operation of each of the following constant pitch propellers:
- (a) non-counter weight; (10 marks)
  - (b) counter weight. (10 marks)
4. With the aid of labelled sketches, describe the construction and operation of a propeller governor. (20 marks)
5. With the aid of labelled sketches, explain the operation of a hydromatic feathering propeller. (20 marks)
6. (a) With the aid of sketches, explain the position and effect of each of the following propeller control levers:
- (i) power;
  - (ii) condition.
- (8 marks)
- (b) Highlight the maintenance procedure for each of the following with reference to propeller balancing:
- (i) static;
  - (ii) dynamic.
- (12 marks)

7. With reference to propeller maintenance, highlight:
- (a) the major repairs; (10 marks)
  - (b) **six** major allowable modifications; (6 marks)
  - (c) **four** effects of repairs and modifications. (4 marks)
8. With the aid of a labelled schematic diagram for a twin-engined turboprop aircraft synchronization system, describe each of the following:
- (a) construction; (12 marks)
  - (b) synchronization; (5 marks)
  - (c) sychrophasing. (3 marks)

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