

2506/201

AIRCRAFT PROPELLERS

Oct./Nov. 2017

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING
(AIRFRAMES AND ENGINES OPTION)

MODULE II

AIRCRAFT PROPELLERS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have drawing instruments for this examination.

*This paper consists of **EIGHT** questions.*

*Answer **FIVE** questions in the answer booklet provided.*

All questions carry equal marks.

Maximum marks for each 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.

4. (a) With the aid of sketches:
- (i) Show **five** parts of a propeller;
 - (ii) Define each of the following:
 - (I) geometric pitch;
 - (II) slips;
 - (III) effective pitch. (10 marks)
- (b) Describe **five** types of propellers. (10 marks)
2. (a) Outline **three** reasons why the engine speed would vary with the airspeed in an aircraft fitted with a constant speed unit. (3 marks)
- (b) With the aid of labelled sketches, show the parts of a propeller constant speed unit. (11 marks)
- (c) (i) Define propeller efficiency.
- (ii) With the aid of a labelled graph, illustrate the propeller efficiency curves. (6 marks)
3. With the aid of a labelled diagram, explain the construction and operation of a propeller de-icing system. (20 marks)
4. (a) Explain how each of the following terms as applied to propeller balancing occurs:
- (i) static imbalance;
 - (ii) dynamic unbalance;
 - (iii) aerodynamic imbalance. (6 marks)
- (b) Explain **four** precautions to be observed when cleaning propeller blades. (4 marks)
- (c) Highlight the procedure for:
- (i) checking the static imbalance of a propeller;
 - (ii) removal of a propeller blade. (10 marks)
5. (a) With the aid of a labelled sketch, show the forces acting on a propeller blade during thrust generation. (6 marks)
- (b) Discuss each of the following with reference to propeller servicing:
- (i) charging the air dome;
 - (ii) lubrication;
 - (iii) reassembly. (14 marks)

- ✓6. (a) Differentiate between:
- (i) synchronization and synchrophasing;
 - (ii) alpha and beta ranges. (6 marks)
- (b) Outline **two** advantages of propeller synchronization. (2 marks)
- (c) With the aid of a labelled sketch, explain synchronization system of a typical twin engine aircraft. (12 marks)
7. (a) List **four** sources of propeller maintenance, repair and inspection information. (4 marks)
- (b) With reference to ICAO regulation requirements, list the aspects of propeller maintenance an aircraft operator is **NOT** allowed to perform. (9 marks)
- (c) Outline **seven** entries to be entered in a propeller log book. (7 marks)
8. An aircraft has been reported to have propeller vibrations in flight.
- (a) Explain **seven** probable causes; (7 marks)
 - (b) List **five** checks to be done; (5 marks)
 - (c) Highlight the procedure of carrying out the checks. (8 marks)

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