

2506/206

AIRFRAME SYSTEMS I

June/July 2019

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING
(AIRFRAMES AND ENGINES OPTION)

MODULE II

AIRFRAMES SYSTEMS I

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments;

Mathematical tables/Non-programmable scientific calculator.

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 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.

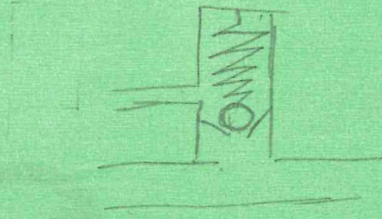
1. With reference to hydraulic system components, sketch and describe each of the following:

(a) pressure relieve valve;

(5 marks)

(b) seals:

- (i) square section;
- (ii) 'O' section;
- (iii) bonded;
- (iv) duplex;
- (v) single chevron.



(15 marks)

2. (a) A small hydraulic jack has two pistons with diameters 0.5 and 0.3 inches respectively. Given that a force of 90 lbs moves the small piston 4 inches down, determine the:

- (i) pressure in the system;
- (ii) *weight lifted;
- (iii) distance moved by the large piston.

$P = \frac{F_1}{A_1}$ $\frac{F_1}{A_1} = \frac{F_2}{A_2}$

(7 marks)

(b) Discuss the characteristics and applications of each of the following types of hydraulic fluids:

- (i) mineral based; - Red (3 marks)
- (ii) synthetic based. - Purple & Ethylene Glycol (5 marks)

(c) Explain **five** precautions observed when handling aircraft hydraulic fluids.

(5 marks)

3. (a) Outline **four** applications of pneumatic system in an aircraft.

(2 marks)

(b) With the aid of a labelled schematic diagram, explain the operation of a two stage air compressor used in aircraft pneumatic system.

(18 marks)

4. (a) With the aid of sketches, describe each of the following types of tricycle landing gear:

- (i) centre line;
- (ii) wing and body.



(7 marks)

(b) Highlight **two** disadvantages of each of the following types of undercarriage:

- (i) tricycle;
- (ii) retractable.

(4 marks)

(c) Explain **three** methods of alternate lowering of the landing gear.

(9 marks)

Hydraulic method
Electrical method
Gravity

5. (a) With reference to aircraft tyres:
- (i) show and label the construction features of the radial ply tyre;
 - (ii) explain the main constructional differences between radial and bias ply.
regulate the amount of air going to CI system (14 marks)
- (b) Outline six functions of a pneumatic electric flow regulator. (6 marks)
6. With reference to landing gear maintenance practices:
- (a) discuss brake testing; (4 marks)
 - (b) highlight the procedure of testing a twin wheeled main undercarriage anti-skid system in flight. (6 marks)
 - (c) Highlight the aircraft landing gear retraction test procedure after a component change. (10 marks)
7. (a) Outline the basic requirements of an aircraft powered steering system. (5 marks)
- (b) With the aid of a labelled sketch, explain the operation of the mechanical side of the powered nose wheel steering system. (15 marks)
8. (a) Discuss each of the following pressurization system test:
- (i) safety valve check; (4 marks)
 - (ii) proof pressure check. (6 marks)
- (b) With the aid of a labelled sketch, show a typical layout of a brushless AC generator. (10 marks)

THIS IS THE LAST PRINTED PAGE.