

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. (7 marks)
- (b) Discuss the characteristics and applications of each of the following types of hydraulic fluids:
- (i) mineral based; (3 marks)
- (ii) synthetic based. (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)



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. (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 mark)
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)

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