2107/305
AIRFRAME TECHNOLOGY
Oct./Nov. 2009
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING (AIRFRAMES AND ENGINES OPTION)

AIRFRAME TECHNOLOGY

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;
Mathematical Tables/non programmable calculator;
Drawing instruments;
A set back development chart/J Chart.

*Answer any **FIVE** of the **EIGHT** questions in this paper.*
All questions carry equal marks.
Maximum marks for each part of a question are as indicated.

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.

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Turn over

1. (a) Explain the relationship between pressure, volume and temperature as applied to an aircraft cabin atmosphere control. (4 marks)

(b) Outline the **four** principles of operation of an aircraft vapour-cycle air cooling system. (4 marks)

(c) With the aid of a labelled sketch, describe the operation of an aircraft vapour-cycle air conditioning system. (12 marks)

2. (a) Describe the application of each of the following aircraft fabrication:

(i) jigs;

(ii) fixtures;

(iii) developments. (6 marks)

(b) Explain the process of determining the bending allowance (BA) of sheet metal during aircraft repairs. Illustrate your answer. (7 marks)

(c) Given the following data:

plate thickness 0.071″;
radius of bend $\frac{5}{32}$″;

angle of bend 125°;
open leg 7″;
flange 5″.

Determine using the J chart provided the length of the material required to fabricate an aircraft spare part. Illustrate your answer. (7 marks)

3. (a) Outline **six** advantages of rigging aircraft cable controlled flight system. (6 marks)

(b) With the aid of sketches, explain how each of the following aircraft flight system components is specifically used:

(i) torque tube;

(ii) bell crank;

(iii) fairlead (6 marks)

(c) With the aid of sketches, explain the construction and operation of servotab system on modern aircraft during pitching. (8 marks)

4. (a) Name any **four** pieces of equipment used during aircraft **pa**inting and doping operation. (2 marks)

(b) Explain any **four** faults associated with aircraft painting **sta**ting the cause of each. (8 marks)

(c) Outline the procedure of painting an aircraft during a **major** check. (10 marks)

5. (a) (i) Explain the criteria of selecting aircraft brake **lining** materials.

(ii) State **four** methods of checking the serviceability **of** aircraft brakes. (8 marks)

(b) Explain the causes of each of the following aircraft brake **faults**:

(i) dragging;

(ii) grabbing;

(iii) fading. (6 marks)

(c) Sketch and label an aircraft dual-servo type expanding **shoe** brake assembly. (6 marks)

6. With the aid of a labelled schematic diagram describe the lay-**out** and operation of an aircraft pneumatic system. (20 marks)

7. (a) Differentiate between aircraft and engine fuel system. (2 marks)

(b) With the aid of a labelled block diagram, explain the lay**out** and operation of a typical aircraft fuel system of a four engined jet aircraft. (18 marks)

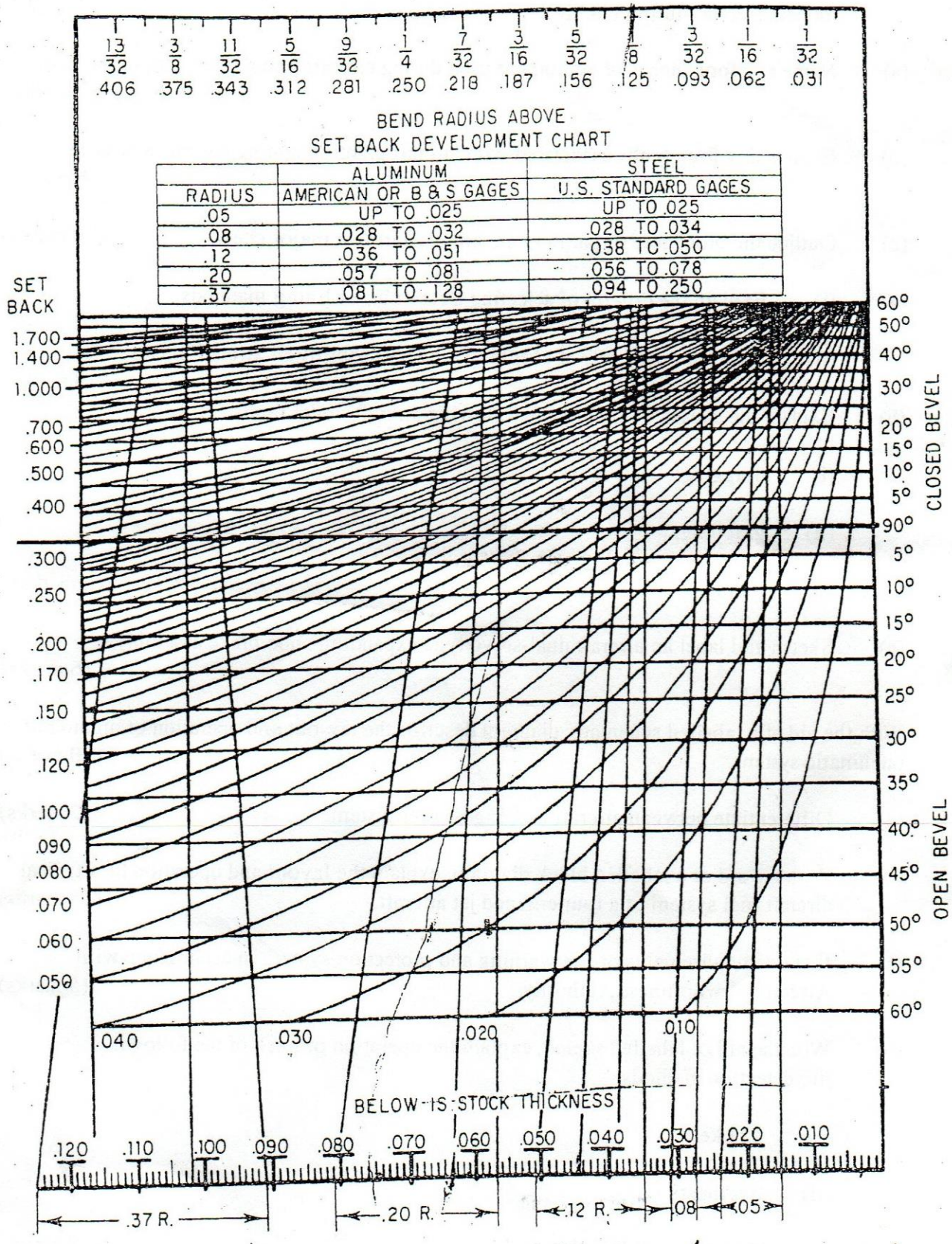
8. (a) List **five** requirements of fire warning and protection **system** in accordance with Aircraft Airworthiness Authority. (5 marks)

(b) With the aid of labelled sketch, explain the operation of **each** of the following aircraft fire detection methods:

(i) smoke;

(ii) overheat;

(iii) thermocouple. (15 marks)



A setback development chart. / J chart