INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
   Answer booklet;
   Mathematical tables/Non-programmable Scientific calculator;
   Drawing instruments.

This paper consists of EIGHT questions in THREE sections; A, B and C.
Answer THREE questions in Section A, ONE question from Section B and ONE question from Section C.
All questions carry equal marks.
Maximum marks for each part of a question are as indicated.
Candidates should answer the questions in English.
SECTION A: AIRFRAME STRUCTURE

Answer THREE questions from this section.

1. (a) With the aid of sketches, explain five types of loads which aircraft structural members are subjected to during operation.

(b) With the aid of sketches, differentiate between each of the following aircraft types:

(i) helicopter and gyroplane;

(ii) flying boat and float plane.

2. (a) With the aid of sketches, explain how each of the following reference lines are used in aircraft station numbering:

(i) butt line;

(ii) water line.

(b) (i) Define each of the following aircraft structural terms:

(I) ATA - 100;

(II) Zoning.

(ii) Classify structural zoning and give two examples for each.

(iii) Outline two advantages of zoning.

3. (a) With the aid of a labelled sketch, describe the helicopter flight controls.

(b) Explain the function of each of the following helicopter components:

(i) clutch;

(ii) free wheeling unit.

4. Highlight the procedure of carrying out each of the following:

(a) preparation of a damaged area for repair;

(b) patch repair to a pressurized area;

(c) making a simple bend on a sheet metal.
SECTION B: AERODYNAMICS

Answer ONE question from this section.

3. (a) Outline six ways in which lift can be increased for landing and take-off. (6 marks)

(b) Outline four parameters that affect the thickness of the boundary layer. (4 marks)

(c) Explain five characteristics of an ideal aerofoil section. (10 marks)

6. (a) A monoplane wing of area 36 m² has a span of 15 m and chord of 2.4 m. Calculate the:

(i) induced drag coefficient;

(ii) induced drag. (4 marks)

(b) Table 1 represents data of coefficient of lift and angle of attack.

Table 1

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<th>Angle of attack</th>
<th>-2</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient of lift</td>
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<td>0.3</td>
<td>0.44</td>
<td>0.6</td>
<td>0.72</td>
<td>0.88</td>
<td>1.0</td>
<td>1.19</td>
<td>1.16</td>
<td>0.96</td>
<td>0.6</td>
</tr>
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</table>

Using the data:

(i) draw the lift curve;

(ii) explain the relationship between lift and angle of attack. (16 marks)

SECTION C: AIRFIELD SAFETY AND PROCEDURES

Answer ONE question from this section.

7. (a) Outline four impacts of noise on performance of personnel in a maintenance organization. (4 marks)

(b) Explain how social psychology affects the human limitations in the aircraft maintenance organization and aviation industry. (16 marks)

8. (a) State the categories of licence without type rating that Kenya Civil Aviation Authority can issue to aircraft maintenance engineers. (6 marks)

(b) State five functions of a ground power unit. (5 marks)

(c) Outline the operating procedures of each of the following:

(i) air starter unit;

(ii) aircraft ground power unit. (9 marks)

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