EAST AFRICAN SCHOOL OF AVIATION
END OF TERM EXAMINATIONS

SUBJECT: THEORY OF FLIGHT

DIPLOMA IN AERONAUTICAL ENGINEERING (A&E OPTION)

STREAM: MODULE II (MARCH)

Date: 011/04/2017     Duration: 3 hrs

Time: 0900a.m.-1200p.m.

INSTRUCTIONS TO CANDIDATE

1. This paper consists of EIGHT questions

2. Any FIVE questions carry equal marks

3. Answer all questions in the space provided in this paper.
1. (a) Explain the effect of **weight** of the following:

(i) Take off Distance

(ii) Stalling Speed

(b) Differentiate between **absolute ceiling** and **service ceiling**.

(c) What is the effect of Altitude on the minimum and maximum speeds of an Aeroplane.

2. With the aid of sketches, explain the effects of the following factors on the power curves of a propeller aircraft.

(i) Altitude

(ii) Aircraft Weight

(iii) Engine settings

3. (a) Twin jet engine aeroplane whose mass is 150,000kg is established on a climb with engines operating L/D ratio is 10:1. Each engine has a Thrust of 120,000N. Calculate the climb angle and gradient of climb, given G=10m/s/s.

(b) With the aid of sketches, show the forces acting on an Aircraft in climbing mode.

4. Explain the following with the aid of a labeled diagram:

(i) T.O.D.A.

(ii) T.O.R.A.

(iii) A.S.D.A.

(iv) Stopway

5. An Aircraft with a climb gradient of 15.7% with all engines operating, will be 314ft higher after travelling 2000ft horizontally, but the one engine inoperative climb gradient is 3.7%. What will be the height gain with a 3.7% gradient. Illustrate your answer.

6. Following a take off, a light twin engine aeroplane has a 10% climb gradient. By how much will it clear a 900meter high obstacle situated 9740meter from the end of the take off distance available.
7. The normal climbing speed of a certain propeller Aircraft if mass 2500kg is 56.5 m/s. At this speed, the **power required** is 210KW. If the **maximum power available** from the propeller is 375 KW, calculate the angle of climb and the rate of climb. 

8. The following table gives data of a certain propeller Aircraft of mass 1050Kg.

On the same axis plot the graph of **Power available** and **Power required** versus **Airspeed**. From the graph estimate the following.

i) The minimum speed for level flight

ii) The maximum speed for level flight

iii) The speed for maximum range

iv) The speed for maximum endurance

<table>
<thead>
<tr>
<th>Airspeed (m/s)</th>
<th>23.1</th>
<th>25.7</th>
<th>28.3</th>
<th>30.8</th>
<th>33.4</th>
<th>36.0</th>
<th>38.6</th>
<th>41.1</th>
<th>43.7</th>
<th>46.3</th>
<th>48.8</th>
<th>51.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Available (KW)</td>
<td>135</td>
<td>170</td>
<td>205</td>
<td>225</td>
<td>240</td>
<td>250</td>
<td>255</td>
<td>255</td>
<td>250</td>
<td>240</td>
<td>230</td>
<td>220</td>
</tr>
<tr>
<td>Power Required (KW)</td>
<td>250</td>
<td>115</td>
<td>93</td>
<td>90</td>
<td>100</td>
<td>120</td>
<td>150</td>
<td>180</td>
<td>215</td>
<td>255</td>
<td>300</td>
<td>350</td>
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