



## **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 **(10marks)**

(b) Differentiate between **absolute ceiling** and **service ceiling**. **(4marks)**

(c) What is the effect of Altitude on the minimum and maximum speeds of an Aeroplane.  
**(6marks)**

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 **(20marks)**

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  $G=10\text{m/s/s}$ . **(14marks)**

(b) With the aid of sketches, show the forces acting on an Aircraft in climbing mode. **(6marks)**

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

(i) T.O.D.A.

(ii) T.O.R.A.

(ii) A.S.D.A.

(iv) Stopway **(20marks)**

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. **(20marks)**

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. **(20marks)**

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 **(20marks)**

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

**(20marks)**

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

