EAST AFRICAN SCHOOL OF AVIATION EXAMINATION

END TERM I EXAMS

DIPLOMA IN AERONAUTICAL ENGINEERING

AIRCRAFT COMMUNICATION, NAVIGATION AND SURVEILLANCE

STREAM: Module III (Avionics) **Duration:3 Hrs**

DAY/DATE: 6/4/2017 **TIME: 2-5 PM**

INSTRUCTION TO CANDIDATES

You should have the following for this examination:

i) Mathematical table/ scientific calculator

*Answer **ANY FIVE (5) QUESTIONS***

All questions carry equal marks.

Maximum marks for each part of a question are as shown

This paper consists of (4) 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. (a) Define each of the following as applied to radar system

   i. Clutter

   ii. Angle resolution

   iii. Rang resolution **(3 marks)**

   (b) Explain the following with respect to radar system;

   i. Blind speed

   ii. Doppler effect

   iii. Tracking radar system (**13 marks)**

   (c) A low noise radar system operates at 8 GHz with r,f amplifier whose noise figure is $6\ dB$ and bandwidth 400 KHz . The antenna diameter is 4m and it radiates 5W towards a target whose cross- section area is $12m^2$. Determine the radar rang of the system **(4 marks)**

2. (a) Name two components of DME system. **(2 marks)**

   (b) (i) Explain the main purpose of DME system in aircraft navigation. **(4 marks)**

   (ii) Describe the principal of distance measurement in a DME system. **(6 marks)**

   (c) Draw a well labelled block diagram of a total DME system and briefly explain function of each block. **(8 marks)**

3. (a) (i) List the five error associated to VOR System **(5 marks)**

   (ii) Explain any three (3) of the above-mentioned errors. **(6 marks)**

(b) (i) Describe VOR principle of operation

(ii) State two advantage of co-location VOR/DME. **(9 marks)**

4. (a) List the principal factor liable to affect ADF performance and contribute to errors **(6 marks)**

(b) Explain any of the four-factor mentioned in (a) above. **(12 marks)**

(c) State the two major uses of ADF in an aircraft. **(2 marks)**

5. (a) With the aid of a labelled bloc diagram. Describe the operation of a high-level amplitude modulation (AM) transmitter **(10 marks)**

(b) A radar system operating at 8 GHz scans a target which is 800Km away in 30 second. Determine the Doppler frequency Shift of the signal. **(6 marks)**

(c) Explain the function of a mixer in a communication radio receiver. **(4 marks)**

6. (a) Define the following in respect to DME system

i. Pulse repetition frequency

ii. Search mode

iii. Track mode

iv. Transmitter duty cycle

v. Reply efficiency **(5 marks)**

(b) If pule from aircraft take $200\mu s$ to travel to transponder and back again. Find the distance displayed on the aircraft in NM (**5 marks)**

(c) (i) Distinguish the difference between CVOR and DVOR. **(6 marks)**

(ii) Explain the operation of radio magnetic indicator of ADF aircraft receiver.

(4 marks)