EAST AFRICAN SCHOOL OF AVIATION EXAMINATION
EXAM

ENGINEERING SECTION

EXAMINATION FOR THE AWARD OF DIPLOMA IN AERONAUTICAL
ENGINEERING

SUBJECT: FLIGHT MECHANICS

STREAM: TEP III Airframes & Engines   **Duration:** 3 Hrs

DAY/DATE: wednesday: 5/04/2011   **TIME:** 9.00AM – 12.00p.m.

Instructions to Candidates:

1.   This paper consists of two (3) printed pages.
2.   Answer ALL questions.

1. a) Describe the following conditions in the operation of helicopters (illustrate your answer)
      i)   Dissymmetry of lift
      ii) Cariolis effect
      iii) gyroscopic effect
      iv) drift   (20 marks)

2. a) Explain the function of the following helicopter devices:
      i)   Clutch
      ii) Freewheeling
      iii) Transmission

                                                          (6 marks)
    b) State TWO primary effects and ONE secondary effect of cyclic pitch control and collective controls
                                                          (6 marks)

    c) With the aid of sketches describe the forces which act on an helicopter in a steady bank   (8 marks)

3 (a) With the aid of sketches, explain the following aircraft stability modes

      (i)   Phugoid
      (ii) Short period oscillations   (10 marks)

   (b) Explain the causes and remedies of the following modes of aircraft instability

      (i)   Spiral

      (ii) Dutch roll   (10 marks)

 4 (a) An aircraft weighs 40,000 lbs, wing area of 350 ft2 and a wing span of 50 ft. At sea-level the aircraft flies at 200 and 600 ft/sec. Calculate the values of the induced drag and the associated drag coefficients for this case. Noting that Lift = weight in level flight
Assume Oswald efficiency factor of 0.85

                                                          (20 marks)

5 (a)   With the aid of sketches, explain the following aircraft inherent stability features: (10 marks)

       (a) Dihedral angle

       (b) Sweptback angle

       (c) Keel surface

     (b) Discuss the factors which affect aircrafts lateral static stability
                                             (10 marks)