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10AE831

Eighth Semester B.E. Degree Examination, June/July 2016
Flight Testing

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. What is the purpose and planning of flight testing? Explain sources of errors in flight test techniques. (10 Marks)
- b. Explain methods for avoiding or minimizing such errors. (10 Marks)
- 2 a. The airspeed indicator fitted to particular airplane has no instrument error and is calibrated assuming incompressible flow in standard conditions. While flying at sea level in ISA conditions, the indicated air speed is 264m/sec. Find true air speed. (08 Marks)
- b. What are pressure and temperature sensing devices? Explain the corresponding transducing techniques. (12 Marks)
- 3 a. Explain propeller driven airplane PIW – VIW theory for level flight performance. (12 Marks)
- b. Explain the Data Reduction Methods for steady climbs. (08 Marks)
- 4 What are various test methods for determining take off distance? Explain data reduction for takeoff distance and landing distance and write empirical equations for correcting take-off distances to standard conditions for jet and constant speed propeller driven airplanes. (20 Marks)

PART - B

- 5 a. What is the effect of freeing the stick on neutral point position? Explain Flight – path stability measurement from flight testing. (10 Marks)
- b. Explain flight test method for evaluating phugoid and phugoid data reduction. (10 Marks)
- 6 a. Describe the dutch roll, dutch roll flight test techniques, dutch roll data reduction. (12 Marks)
- b. An approximate equation for an aircraft roll mode is
 $P + 0.25p = 5.5 \delta a(t)$
 - i) Determine the steady roll rate for a step input of 10^0 .
 - ii) Determine the magnitude of roll rate after an elapsed time of
 - a) $t = 1$ time constant ($1\tau_R$)
 - ii) $t = 5$ time constant ($5\tau_R$). (08 Marks)
- 7 a. Explain the Cooper – Harper Rating scale. (10 Marks)
- b. What are various flight phases and what are various flight envelopes? (10 Marks)
- 8 a. What are CAR requirements governing stall and what are safety considerations while performing stall maneuver? (10 Marks)
- b. What is Autorotation? What are effects of mass moment of inertia and Airframe components on spin? Explain Flight Test methods for spin testing. (10 Marks)
