Flight Testing VTU CBCS Question Paper Set 2018

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10AE831

Eighth Semester B.E. Degree Examination, June/July 2017

Flight Testing

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Explain techniques for minimizing errors related to flight testing. **(12 Marks)**

b. Explain the weighing and ballasting techniques. **(08 Marks)**

2 a. Explain on board and ground system of radio telemetry functions for data acquisition. **(10 Marks)**

b. What are temperature sensing devices used in flight testing? **(10 Marks)**

3 a. Give the details of endurance of propeller driven aircraft and jet aircraft. **(12 Marks)**

b. Write notes on:
i) Constant speed propeller
ii) Fixed pitch propeller. **(08 Marks)**

4 What are the test methods used for takeoff and landing tests? **(20 Marks)**

PART – B

5 a. Explain flight test methods determining neutral point. **(10 Marks)**

b. Explain flight test methods for quantitative evaluation. **(10 Marks)**

6 a. Explain steady heading sideslip method for determining lateral directional static stability. **(10 Marks)**

b. Explain directional stability. **(10 Marks)**

7 Explain the Cooper-Harper pilot rating scale for handling qualities of aeroplanes. **(20 Marks)**

8 a. Explain the flight test method for stall testing and data requirement. **(10 Marks)**

b. Explain flutter, vibration and buffet in a drive testing. **(10 Marks)**

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Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018
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 are the different types of Flight Tests carried on airplane? Explain each of them. **(10 Marks)**

b. What are the methods of reducing uncertainty in flight test data? **(10 Marks)**

2 a. What are the linear measurement instruments used in airplane flight testing? Give the description of them mentioning their advantages and disadvantages. **(10 Marks)**

b. Name the unit used to measure vibration of an engine. Describe the sensor. **(10 Marks)**

3 a. Derive the Level Flight Performance relationship for a jet engine airplane **(10 Marks)**

b. Derive the condition for maximum range for a propeller driven airplane. **(05 Marks)**

c. Name and explain the reduction methods for a steady climb. **(05 Marks)**

4 a. Derive an expression for Take – off ground run. **(10 Marks)**

b. What is the relationship between radius of turn, flight velocity and load factor during a steady level turn? **(10 Marks)**

PART – B

5 a. Explain the Flight test method for determining the control force neutral point. **(10 Marks)**

b. Explain the techniques used to test airplane short periods. **(10 Marks)**

6 a. What is Directional stability and how is it increased in airplane? **(10 Marks)**

b. What is Control free lateral directional stability and explain what is rudder lock? **(10 Marks)**

7 a. Explain Cooper – Harper pilot rating scale. **(10 Marks)**

b. Explain the flight test procedure to evaluate handling quality of an aircraft. **(10 Marks)**

8 a. What are the regulation requirements for flutter test and how is freedom from flutter ensured in designs and during testing? **(10 Marks)**

b. What are the Air worthiness standard limitations of spin on different categories of airplane? **(10 Marks)**

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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 – VJW 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)**

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