Reg. No. | | | | | | | | | | |

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

SECOND SEMESTER M.TECH. (AEROSPACE ENGG.)

END SEMESTER DEGREE EXAMINATION, JUNE - 2019

SUBJECT: FLIGHT MECHANICS [ICE5202]

TIME: 3 HOURS MAX. MARKS: 50

Instructions to candidates :*Answer ALL questions and missing data may be suitably assumed.*

1A Define i) Indicated air speed ii) Calibrated air speed iii) Equivalent airspeed iv) True airspeed. How are they related?

1B Draw thrust curve of an aircraft. Explain its significance.

1C Derive relationship between induced drag and parasitic drag when rate of descent is a minimum and endurance is maximized considering gliding flight performance.

(3+3+4)

2A Write the transformation matrix to transform stability axis to body axis with an example.

2B Obtain turn radius and rate expression for pull up and pull down performance of an aircraft.

2C Define i) Specific endurance ii) Specific range. Also obtain average value of range equation.

(2+4+4)

3A Specify the sign convention used to define a positive control surface deflection.

3B Express aircraft drag and aircraft lift in terms of respective coefficients. Explain the parameters on which these coefficients are dependent.

3C With suitable figures, illustrate the longitudinal static stability requirement.

(2+4+4)

4A How aileron deflection δ_a and rudder deflection δ_r affect aircraft rolling moment?

4B What are three contributions of wing on change in yawing moment coefficient because of nondimensional roll rate C_{np}?

4C Describe Phugoid mode of operation of an aircraft.

(4+3+3)

5A Explain Roll mode and Spiral mode of performance of an aircraft.

5B With a block diagram explain simplified control augmentation system (CAS).

5C List and briefly explain any three autopilot modes of operation.

(4+3+3)

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