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18AE71

Seventh Semester B.E. Degree Examination, Feb./Mar.2022 Aircraft Stability & Control

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the static stability with an illustration. (10 Marks)
b. Explain longitudinal static stability and its criteria to achieve it. (10 Marks)

OR

- 2 a. What do you mean by stick-fixed longitudinal stability? Derive the stick fixed neutral point on longitudinal static stability. (10 Marks)
b. Derive the equation to show how the elevator angle depends on lift co-efficient. (10 Marks)

Module-2

- 3 a. Explain in detail about surface floating characteristics and effect of Aerodynamics balance in longitudinal stability. (10 Marks)
b. Discuss on trim tabs and its types with a neat sketch. (10 Marks)

OR

- 4 a. Derive the estimation of hinge moment parameters in stick-free conditions. (10 Marks)
b. Derive stick force gradient in an unaccelerated flight conditions. (10 Marks)

Module-3

- 5 How the swept wing obtains directional stability when disturbed, explain with the derivation? (20 Marks)

OR

- 6 Explain rudder lock and the dorsal fin with a neat sketch. (20 Marks)

Module-4

- 7 a. Derive the derivatives due to time rate of change of Angle of attack. (10 Marks)
b. Derive the derivatives due to change in forward speed. (10 Marks)

OR

- 8 a. With the help of derivatives show the changes in pitching moment co-efficient is due to change in pitching velocity. (10 Marks)
b. How do you derive the rolling rate "P" caused derivatives? (10 Marks)

Module-5

- 9 a. What is dynamic stability? Explain the types of its modes with a neat sketch. (10 Marks)
b. Explain the flying qualities in pitch condition. (10 Marks)

OR

- 10 a. What is meant by dutch roll, explain how it is caused? (10 Marks)
b. Explain the terms:
(i) Auto-rotation. (ii) Spin.
(iii) Spiral instability. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.