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Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Aircraft Performance and Stability

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Derive the general equation of motion with neat diagram. (10 Marks)
- b. Derive an equation for power available and maximum velocity. (10 Marks)

OR

- 2 a. Derive the equation of motion for rate of climb. (10 Marks)
- b. Explain about climb performance hodograph plane. (10 Marks)

Module-2

- 3 a. Explain about the wing loading and drag polar. (10 Marks)
- b. Explain about the aerodynamic relations associated with lift and drag ratio. (10 Marks)

OR

- 4 a. Derive the range equation for propeller driven airplane. (10 Marks)
- b. Derive endurance equation for Jet airplane. (10 Marks)

Module-3

- 5 a. Derive the equation for calculation for ground roll. (10 Marks)
- b. Derive the equation for balanced field length. (10 Marks)

OR

- 6 a. Derive the equation for level turn and load factor. (10 Marks)
- b. With the neat sketch, explain briefly about V-n Diagram. (10 Marks)

Module-4

- 7 a. Derive and explain about the contribution of wing in the stability and control. (10 Marks)
- b. Derive and explain about Tail contribution in the stability and control. (10 Marks)

OR

- 8 a. Derive and explain about fuselage contribution of the stability and control in airplane. (10 Marks)
- b. Derive and explain about longitudinal control, elevator power, elevator angle versus equilibrium lift co-efficient of the stability and control. (10 Marks)

Module-5

- 9 a. Derive and explain the Hinge moment parameters. (10 Marks)
- b. Explain about the control surface floating characteristics and aerodynamic balance. (10 Marks)

OR

- 10 a. Explain briefly about estimation of hinge moment parameters in stock free conditions. (10 Marks)
- b. Explain briefly about Stick-Free Neutral Point. (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.