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Question Paper Code : 40523

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fifth Semester

Aeronautical Engineering

AE 6501 – FLIGHT DYNAMICS

(Regulations 2013)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. Differentiate between thrust and thrust power.

2. Depict the forces acting on an aircraft during steady flight.

3. What is bank angle ?

4. Which would be higher – steepest angle of climb or shallowest angle of glide ? Why ?

5. Indicate the centre of gravity of a static flight.

6. Mention the significance of hinge moment coefficient.

7. What is aileron reversal ? Give its significance.

8. State the function of a rudder.

9. List the modes of stability.

10. Mention the difference between static and dynamic stability.

PART – B   (5×13=65 Marks)

11. a) i) Describe the different types of drag on a flight and their estimation with suitable illustrations.   (10)

      ii) Show the moments an aircraft is subjected to with a sketch.   (3)

(OR)

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b) i) Considering a steady flight determine the expressions for drag polar and thrust required. (10)

ii) Mention the condition for minimum power required for a flight. What are the implications of it ? (3)

12. a) i) What is range and endurance of a flight ? (5)

ii) Derive expressions for endurance and range for a jet aircraft. (8)

(OR)

b) What is turning performance and minimum radius of turn ? Deduce an expression for turning performance and minimum radius of turn. (4+9)

13. a) What are static and dynamic stability ? Indicate inherently stable and marginal stable aircraft with suitable schematic. (4+9)

(OR)

b) i) What are stick free and stick fixed stability ? (4)

ii) Obtain expression for stick free neutral point and stick force. (9)

14. a) i) Brief on lateral control of aircraft. (4)

ii) Deduce expressions for directional stability due to wing sweep and rudder control. (9)

(OR)

b) i) Describe about coupling and rolling moments of an aircraft. (9)

ii) What is weather cocking effect ? Mention its characteristics. (4)

15. a) i) List the modes of dynamic stability. (5)

ii) Discuss briefly about dynamic longitudinal stability. (8)

(OR)

b) Explain the effect of freeing the stick. Deduce the expression and coefficients for dynamic lateral stability. (3+10)

PART – C (1×15=15 Marks)

16. a) A 1500 kg aircraft is flying in a level flight at a constant speed of 250 kmph. The altimeter reads 1700 m, and the temperature is 32°C. If the thrust required to maintain this altitude and speed is 150 kg, find the lift and drag, density altitude and density ratio.

(OR)

b) For a range of 650 kms and a cruising speed of 480 kmph at 10,000 m altitude which of the following power plant is most efficient, Reciprocating engine, Turbo propeller and Turbojet ?

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