Reg. No. :

Question Paper Code : 50026

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

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. List the aerodynamic forces acting on an airplane with its unit.

2. What is parasite drag ?

3. Write down the power available equation for piston propeller type aircraft.

4. Define load factor.

5. Distinguish between stability and controllability.

6. Mention the need of aerodynamic balancing for an airplane.

7. Write down the Rolling and Yawing moment coefficients of an airplane.

8. How to solve the one engine inoperative condition in stability aspect ?

9. Define stick force gradient.

10. What are the modes of dynamic stability ?

PART – B   (5×13=65 Marks)

11. a) Draw the power required and power available curve for a jet engine and piston
engine. State your observations and discuss the effect of altitude on these
curves.   (13)

(OR)

b) Derive the condition for minimum thrust required and minimum power required
in straight and level flight case.   (13)

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12. a) Explain with sketches, the pull up and push over maneuvers of flight and derive the expressions for turn rate and turn radius. (13)

(OR)

b) Draw and explain the significance of V-n diagram also discuss how it is helpful to find the structural stability of an airplane. (13)

13. a) i) Derive the expression for wing contribution to static longitudinal stability and offer your comments on this expression. (7)

ii) What do you mean by stick fixed and stick free longitudinal static stability ? (6)

(OR)

b) i) Explain about stick force gradients. (7)

ii) What is aerodynamic balancing ? Explain in detail. (6)

14. a) i) Write short notes on Dihedral effect and aileron reversal. (7)

ii) Discuss about adverse yaw and crosswind landings. (6)

(OR)

b) Discuss in detail the contribution of various components of the airplane on static lateral and directional stability. (13)

15. a) How does Dutch roll, auto rotation and spin happen in an airplane ? Explain with neat sketches. (13)

(OR)

b) Discuss the various stability derivatives relevant to lateral dynamics. (13)

PART – C   (1×15=15 Marks)

16. a) Discuss the significance of location of center of gravity and neutral point in airplane design. Also locate the C. G and N. P in normal stable aircraft. Justify with reasons. (15)

(OR)

b) The statically stable aircraft may be dynamically stable or unstable. Similarly dynamically stable aircraft may be statically stable or unstable. Are both statements true ? Justify the reason with suitable example. (15)

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