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INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
(Dundigal-500043, Hyderabad)

B.Tech VIII SEMESTER END EXAMINATIONS (REGULAR) - JUNE 2022

Regulation: R18

AUTOMATIC CONTROL OF AIRCRAFT

Time: 3 Hours

(AERONAUTICAL ENGINEERING)

Max Marks: 70

**Answer FIVE Questions choosing ONE question from each module
(NOTE: Provision is given to answer TWO questions from any ONE module)**

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

MODULE – I

1. (a) Write a short note on navigation system. Differentiate between magnetic north and true north used for navigation purpose. [BL: Understand| CO: 1|Marks: 7]
- (b) Compare the merits and demerits of feedback control systems in comparison to open loop control system. [BL: Apply| CO: 1|Marks: 7]
2. (a) Describe the term guidance. Determine the non-linear guidance laws used for practical case of the aircraft guidance. [BL: Understand| CO: 1|Marks: 7]
- (b) Explain the effects of elevator deflection in downwards on longitudinal static stability with neat diagram. Draw the flow pattern with and without elevator deflection on total airplane. [BL: Understand| CO: 1|Marks: 7]

MODULE – II

3. (a) List out control laws of the automatic flight control system. Discuss the one-dimensional or two-dimensional inputs on the flight controls. [BL: Understand| CO: 2|Marks: 7]
- (b) Illustrate different types of control augmentation system and which one is the most suitable for the high maneuvering fighter plane. [BL: Understand| CO: 2|Marks: 7]
4. (a) Discuss about gain schedule system and its concepts for control of non-linear systems for the different operating points. [BL: Understand| CO: 2|Marks: 7]
- (b) Describe about stability augmentation system. Discuss application of feedback in stability augmentation system. [BL: Understand| CO: 2|Marks: 7]

MODULE – III

5. (a) Demonstrate the derivatives due to change in downward velocity with diagram. Explain the each terms with proper applications. [BL: Understand| CO: 3|Marks: 7]
- (b) Describe the relationship with Phugoid approximation with short period approximation methods to find dynamic characteristics. [BL: Understand| CO: 3|Marks: 7]
6. (a) Explain about glide slope coupler and automatic flare control and pitch orientation control system. [BL: Understand| CO: 4|Marks: 7]

- (b) Discuss the acceleration control system with block diagram also write the equation. Draw the block diagram of inner loop of the acceleration system with all the elements.

[BL: Understand| CO: 4|Marks: 7]

MODULE – IV

7. (a) How much of the aircraft is man controlled and how much is computer controlled and how it is achieved? [BL: Understand| CO: 5|Marks: 7]
(b) Discuss about yaw orientation control system. Explain in detail about damping of the dutch roll with neat sketch. [BL: Understand| CO: 5|Marks: 7]
8. (a) Demonstrate the NAV mode of the auto pilot and explain its functions with neat diagrams. [BL: Understand| CO: 5|Marks: 7]
(b) Discuss about closed loop flight control systems and how this system is used for the automation of the rolling aircraft. [BL: Understand| CO: 5|Marks: 7]

MODULE – V

9. (a) Discuss about digital implementation of flight control system and list its advantages and disadvantages. [BL: Understand| CO: 6|Marks: 7]
(b) Illustrate about the fly by wire system used in aircraft and air vehicles. List its features and advantages. [BL: Understand| CO: 6|Marks: 7]
10. (a) Differentiate between fly by wire and power by wire system. Discuss about the handling qualities of the modern fly by wire. [BL: Understand| CO: 6|Marks: 7]
(b) Demonstrate the self-adaptive autopilot and the philosophy behind controlling of the airplane giving suitable sketch with all elements. [BL: Understand| CO: 6|Marks: 7]

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