

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 3170108

Date: 22/05/2026

Subject Name: Aircraft Control and Navigation

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

- Q.1**
- (a)** List the Main Aircraft Reference Frames. **03**
 - (b)** Define Short Period Mode in longitudinal dynamics. **04**
 - (c)** Describe the principle and application of Automatic Approach and Landing systems in an aircraft. **07**
- Q.2**
- (a)** State the primary purpose of a Longitudinal Autopilot. **03**
 - (b)** Explain the function of a Yaw Orientation Control System in lateral autopilot. **04**
 - (c)** Differentiate between Position Fixing and Dead-reckoning systems of navigation. **07**
- OR
- Q.2**
- (c)** Describe the working principle of Very High Frequency Omni-Directional Range (VOR) navigation system. **07**
- Q.3**
- (a)** What are the three primary parameters that define the aircraft attitude with respect to earth? **03**
 - (b)** Explain the role of the Guide Slope Coupler in a Longitudinal Autopilot system. **04**
 - (c)** Explain Damping of Dutch Roll in lateral autopilot, explaining how it enhances aircraft stability. **07**
- OR
- Q.3**
- (a)** List the main characteristic of the Longitudinal Transfer Function for Elevator displacement? **03**
 - (b)** Explain the concept of Inertial Cross-Coupling in aircraft dynamics. **04**
 - (c)** Explain the essential components and working of an Inertial Navigation System (INS). **07**
- Q.4**
- (a)** What is Inertial Cross Coupling? **03**
 - (b)** Briefly the function of the Automatic Fuel Control system. **04**
 - (c)** Explain the significance of Integration with Flight Management and Flight Direction System in Aircraft Auto Pilot Systems. **07**
- OR
- Q.4**
- (a)** List any three major kinds of navigation systems. **03**
 - (b)** Define the term Position Fixing in navigation. **04**

(c) Explain the effect of Dutch Roll on the aircraft's motion, and how yaw orientation control system addresses to this? **07**

- Q.5**
- (a) List the main Aircraft Reference Frames used in dynamics. **03**
 - (b) Explain the basic principle of operation for GPS based navigation. **04**
 - (c) Explain how a Yaw Orientation Control System works to maintain directional stability. **07**

OR

- Q.5**
- (a) Define Aerodynamic Angles. **03**
 - (b) Briefly the difference between LORAN and OMEGA navigation. **04**
 - (c) Explain concepts of a longitudinal autopilot to briefly explain the working of an Acceleration Control System. **07**
