Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3170108 Date:12-05-2025

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.**

			Marks
Q.1	**(a)**	What is short period mode?	**03**
	(b)	Explain Lateral Autopilot with block diagram.	**04**
	(c)	Explain Euler angle system to establish relations between Inertial and Body reference.	**07**
Q.2	**(a)**	Explain the assumptions which are made to derive an equation of motion of Aircraft.	**03**
	(b)	How does automatic fuel system control work?	**04**
	(c)	A commercial aircraft is flying from Mumbai to Delhi under Instrument Flight Rules (IFR). The weather en route is overcast, with low visibility, requiring the pilots to rely entirely on their instruments. How is the aircraft determining its position and maintaining its course when visibility is limited, and what method are the pilots using to ensure they are following the correct route to the next waypoint?	**07**
		OR	
	(c)	A military aircraft is flying over the open ocean on a long-range mission, far from any ground-based navigation aids or GPS signals. The aircraft's mission requires precise navigation to reach a specific target zone without detection, so it cannot rely on external signals. As the journey progresses, weather conditions worsen, with thick clouds and heavy turbulence making visual navigation impossible. How is the aircraft able to maintain precise navigation and know its position without relying on external signals like GPS or ground-based aids, even over the open ocean?	**07**
Q.3	**(a)**	Write a note on Glide slope coupler.	**03**
	(b)	Draw a block diagram of basic displacement autopilot	**04**
	(c)	Explain Automatic Flare out and Approach system.	**07**
		OR	
Q.3	**(a)**	Define (i) Stability (ii) Navigation.	**03**
	(b)	Explain ILS/MLS coupled Autopilot system in brief.	**04**
	(c)	Explain Dutch roll Damping with block diagram	**07**
Q.4	**(a)**	Define Phugoid.	**03**
	(b)	Explain GPS based navigation.	**04**
	(c)	Mention the aircraft parameters that affect the stability in case of inertial cross coupling.	**07**

OR

Q.4	**(a)**	What is effect of high roll rate on aircraft's stability?	**03**
	(b)	Write a short note on Deck reckoning. Give example of its application.	**04**
	(c)	Explain the system used for controlling coupling condition in aircraft	**07**
Q.5	**(a)**	Write a short note on surveillance.	**03**
	(b)	Explain Acceleration control system with suitable block diagram.	**04**
	(c)	Derive equation for Turn Compensation with suitable sketch.	**07**

OR

Q.5	**(a)**	Explain inertial cross coupling.	**03**
	(b)	Explain Pitch Orientation control system with functional diagram.	**04**
	(c)	Explain yaw orientation control system with diagram.	**07**

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