

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V EXAMINATION – WINTER 2025****Subject Code:3150101****Date:19-11-2025****Subject Name:Flight Mechanics****Time:10:30 AM TO 01:00 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) Define Pressure, Altitude, and Temperature.	03
(b) Explain the concept of center of gravity (CG) and its impact on aircraft stability.	04
(c) Discuss the factors affecting takeoff performance in aircraft	07
Q.2 (a) What are the four fundamental forces acting on an aircraft during flight?	03
(b) How does an aircraft maintain steady level flight? Explain.	04
(c) Examine the limitations on forward and rearward movements of the center of gravity and their implications for takeoff and landing performance.	07
OR	
(c) Analyze the factors that influence landing performance and evaluate how adjustments in the center of gravity affect these factors.	07
Q.3 (a) Can you recall the primary components of an aircraft's longitudinal stability? Write	03
(b) Given specific aircraft specifications, calculate the minimum runway length required for takeoff.	04
(c) Draw a temperature distribution in the standard atmosphere.	07
OR	
Q.3 (a) Define Lift and Thrust.	03
(b) What are the main factors that affect an aircraft's stall speed?	04
(c) Discuss the concept of stability in aircraft flight and its importance.	07
Q.4 (a) Draw a Thrust required curve.	03
(b) Write a note on absolute and service ceilings.	04
(c) Apply the principles of weight and balance to determine the optimal loading configuration for a given aircraft.	07
OR	
Q.4 (a) Explain in short Pull up.	03
(b) Draw V-N diagram and explain.	04
(c) Evaluate the influence of atmospheric conditions on aircraft performance and handling.	07
Q.5 (a) Discuss Roll Control.	03
(b) Make a Relation between geopotential and geometric altitudes.	04
(c) Assess the impact of changes in center of gravity on aircraft stability and maneuverability.	07
OR	
Q.5 (a) Shortly Discuss on Stick fixed vs. Stick free Stability.	03
(b) Critically analyze the factors contributing to aircraft accidents and propose preventative measures.	04
(c) Design a flight control system for an unmanned aerial vehicle (UAV) to optimize stability and maneuverability.	07