Name: **Enrolment No:**	

UPES

End Semester Examination, December 2023

Course: Aircraft Systems & Instruments **Semester: III**
Program: B.Tech ASE **Time : 03 hrs.**
Course Code: ASEG2012 **Max. Marks: 100**

Instructions: All questions are compulsory
Use figures to explain the concept.

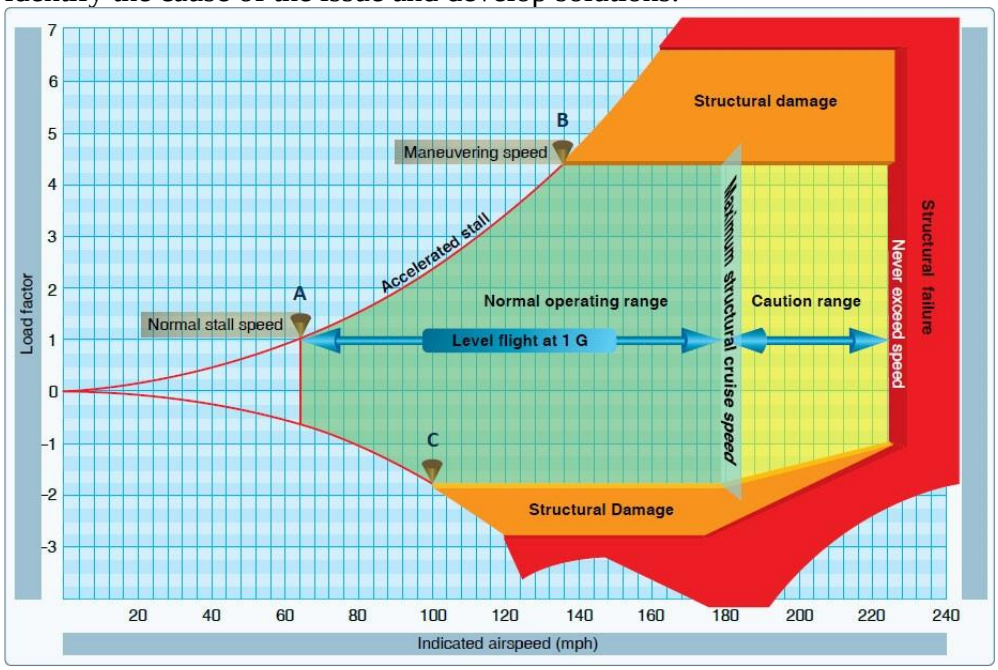
SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	What are the primary classifications of landing gear systems in aviation?	**4**	**CO2**
Q 2	How does a typical starting system work for a piston engine?	**4**	**CO3**
Q 3	Explain the principles and mechanisms of operation of airspeed indicators and the differences between TAS, EAS, and Mach meters.	**4**	**CO5**
Q 4	How do fire protection systems detect and suppress fires in different areas of an aircraft?	**4**	**CO3**
Q 5	What is the difference between an evaporative vapor cycle system and a standard vapor cycle system in terms of operation and benefits?	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)

Q 1	How might advancements in technology impact the design and use of deicing and anti-icing systems in aviation?	**10**	**CO6**
Q 2	How can engine instruments be adjusted and monitored to optimize engine performance during different phases of a flight? **OR** How does an altimeter use atmospheric pressure to determine an aircraft's altitude?	**10**	**CO5**
Q 3	How does a malfunction or cyberattack on a digital fly-by-wire system affect an aircraft's control and safety?	**10**	**CO1**
Q 4	Explain the evolution of aircraft control systems from conventional, fully powered flight controls to modern digital fly-by-wire systems.	**10**	**CO1**

SECTION-C
(2Qx20M=40 Marks)

Q 1	a) Evaluate the advantages and limitations of autopilot systems in managing various flight phases and scenarios.	**10**	**CO4**
	b) Discuss briefly about Pitot Static systems with necessary diagrams.	**10**	**CO5**
Q 2	**Please read the below article and answer the questions,** A new aircraft model has been introduced into the market, and its flight safety envelope is being evaluated. The flight safety envelope is the range of values for various parameters, such as altitude, airspeed, and angle of attack, within which an aircraft can be operated safely. During the testing phase, it was found that the aircraft had a narrower safety envelope than originally anticipated. This created concerns among the aviation authorities and the aircraft manufacturer, who worked together to identify the cause of the issue and develop solutions.  *Figure 1* ***Typical V-n diagram*** *Courtesy https://www.uavnavigation.com/support/kb/general/general-system-info/flight-envelope* **Questions: [5x4=20]** a) What are the parameters used to define the flight safety envelope? b) In what ways can the aircraft manufacturer and aviation authorities work together to ensure the safety of the aircraft and its passengers? c) What are the potential consequences of operating an aircraft outside of its safety envelope? d) Analyze the impact of the narrower safety envelope on the aircraft's performance and safety and identify areas where improvements could be made. **OR**	**20**	**CO6**

	How does a pilot Navigate? How is the navigation system useful for an aircraft? Which navigation system is the most used in aviation? How did aircraft navigate before GPS?		