CBCS SCHEME

USN | | | | | | | | | | |

BAE602

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Aircraft Performance and Stability

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Derive the equations of motion of an aeroplane through the three-dimensional space over a flat earth.	10	L3	CO1
	b.	Explain clearly with neat figures the four forces of flight.	10	L2	CO1
		OR			
Q.2	a.	Derive the equation of motion for rate of climb with neat diagrams.	10	L3	CO1
	b.	Derive and explain the analytical approach of maximum climb angle.	10	L3	CO1
		Module – 2			
Q.3	a.	Explain the following: i) Thrust to weight ratio ii) Wing loading iii) Drag polar iv) Left-to-drag ratio.	10	L2	CO1
	b.	Derive the Breguet equation commenting on the range of the propeller driven aero plane.	10	L3	CO1
		OR			
Q.4	a.	Estimate the maximum range at 30,000 ft for the Gulfstream IV. The maximum usable fuel weight is 29,500 lb. Thrust specific fuel consumption of the Rolls – Royer Tay turbofan at 30,000 ft is 0.69 lb of fuel consumed per hour per pound of thrust. Consider $\rho_\infty = 8.906 \times 10^{-4}$ slug/ft^3. Also find flight velocity.	10	L3	CO1
	b.	Explain the endurance and range for jet propelled airplane with relevant equations.	10	L2	CO1
		Module – 3			
Q.5	a.	Derive the equations of ground roll of an aircraft during takeoff.	10	L3	CO2
	b.	Calculate the approach distance of an aircraft during landing.	10	L3	CO2
		OR			
Q.6	a.	Derive the equation for the turn rate of an aircraft.	10	L3	CO2
	b.	Explain the V-n diagram.	10	L2	CO2

		Module – 4			
Q.7	**a.**	Derive the equation for wing contribution of static longitudinal stability.	**10**	**L3**	**CO3**
	b.	Derive the fuselage contribution equations for static longitudinal stability.	**10**	**L3**	**CO3**
		OR			
Q.8	**a.**	Derive equation of tail contributions of static longitudinal stability.	**10**	**L3**	**CO3**
	b.	Derive the equations for stick fixed neutral point.	**10**	**L3**	**CO3**
		Module – 5			
Q.9	**a.**	Explain the hinge moment parameters with relevant equations.	**10**	**L2**	**CO4**
	b.	Explain trim tabs and stick force gradient with relevant figures.	**10**	**L2**	**CO4**
		OR			
Q.10	**a.**	Write a note on weather working effect.	**10**	**L2**	**CO4**
	b.	Explain the requirements of directional control.	**10**	**L2**	**CO4**

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