Sanjay Ghodawat University, Kolhapur

2020-21

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

EXM/P/09/00

Year and Program: Third Year B.Tech	**School of Technology**	**Department: Aeronautical Engineering**
Course Code: AET 304	**Course Title: FLIGHT MECHANICS**	**Semester : VI**
Day and Date:	**End Semester Examination**	**Time : 2 Hrs.** **Max Marks : 50**

Instructions: 1) All Questions are compulsory.

Q. 1		**Answer/Solve the following (any Two)**	**Marks**	Bloom's Level	CO
	a)	Explain the different types of Drag acting on an airplane and draw drag polar curve.	8	2	1
	b)	Derive the Expression for minimum power required speed in terms of minimum drag speed.	8	3	1
	c)	An aircraft has the following characteristics: Wing span 20m. Wing area 44m^2 . Total mass 15 tonnes, Fuel mass 4.5 tonnes. Specific fuel consumption 0.6N/N/hr, Zero lift drag coefficient 0.018. Oswald efficiency factor 0.85. Calculate 1. Maximum L/D ratio 2. Maximum range and endurance speed Assume sea level density as 1.2256 kg/m^3	8	3	2
Q. 2		**Answer/Solve the following (any two)**			
	a)	What is NACA Aerofoils? Explain NACA 4 digit and 5 digit with suitable examples.	8	2	3
	b)	Derive the complete Longitudinal Stick fixed static stability equation from basic principle and state the stability conditions.	8	3	4
	c)	Derive Longitudinal Stick free static stability equation from basic longitudinal static stability condition and Deduce the stick free Neutral point of stick free longitudinal static stability.	8	3	4
Q. 3		**Answer/Solve the following (any two)**			
	a)	Discuss the effect of swept wing on directional stability by Deriving suitable expressions.	9	3	5

	b)	A glider in a level flight develops a phugoid motion through thermal disturbance Whose damping is very small.The speed varies between 18 m/s to 20 m/s. Estimate the period of oscillation and vertical amplitude.	9	3	5
	c)	Discuss Dutch roll,Spiral divergence,Spin and Autorotation in detail.	9	2	5

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