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: TY BTech	**School of Technology**	**Department: Aeronautical Engineering**
Course Code: AET306	**Course Title: Aircraft Design**	**Semester : VI**
Day and Date: Wednesday and 9th June 2021	**End Semester Examination**	**Time : 2 Hrs.** **Max Marks : 50**

Instructions: 1) All questions are compulsory.
2) Assume suitable values wherever necessary.

Q.1		**Answer/Solve the following (any two)**	**Marks**	Bloom's Level	CO
	a)	Write in detail about the classification of Computer Aided Design.	8	2	1
	b)	Explain fixed and retractable landing gears in detail.	8	3	1
	c)	Explain the various "types of power plants by location" used in an aircraft.	8	3	1
Q.2		**Answer/Solve the following (any two)**			
	a)	Assume you are a design engineer working on a fixed sweep General Aviation – Twin Engine aircraft. You have three different fuel fractions (W_f/W_0) values of 0.32, 0.45 and 0.50. The crew weight is 400 lb and payload is 12000 lb. Analyze and calculate the take-off weight and state which fuel fraction gives the lowest take-off weight. Aircraft Type | A | C General Aviation – Twin Engine | 1.51 | -0.10	8	5	3
	b)	What is direct operating cost? Examine and write the factors that you would consider while analyzing the direct operation cost.	8	3	2
	c)	The aircraft Cessna Citation II has the following features: e = 0.85, AR = 8.3, m = 6,032 kg, S = 30 m^2, a = 5.9 rad^{-1}, T_{max} = 22,240 N, ρ = 1.225 kg/m^3, C_{D0} = 0.022. Calculate the following: i. Maximum lift-to-drag coefficient ratio. ii. Angle of attack corresponding to the maximum lift-to-drag ratio (at sea level) when $\alpha_0 = 0$. iii. Airspeed corresponding to the maximum lift-to-drag ratio (at sea level). iv. Minimum required thrust for this aircraft to fly.	8	3	3

Q.3		**Answer/Solve the following (any two)**			
	a)	Explain the maintainability of an aircraft.	9	3	4
	b)	Consider an aircraft that needs to undergo wing morphing. Examine and classify explain the out-of-plane transformation and airfoil adjustment that needs to be carried out for the morphing.	9	4	5
	c)	Explain the following pre-design guidelines for an SST: i. Mission profile ii. Environmental impact	9	3	5

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