Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

Course: Aircraft Design **Semester: VIII**
Program: B. Tech Aerospace Engineering **Time 03 hrs.**
Course Code: ASEG 461 **Max. Marks: 100**
Instructions: Use of Design DATA permitted. Assume *appropriate* value for missing DATA

SECTION A (6x5=30 Marks)

S. No.		Marks	CO
Q1	What are the steps for conceptual design of aircraft? [CO1]	**05**	**CO1**
Q2	Compare crew requirements for economy and business class for different aircraft.[CO2]	**05**	**CO2**
Q3	Which term is missing in following expression? Write the corrected expression. [CO2] Fuselage Width(W) = (No. of seats abreast) x seat width + (No. of elbow gaps) x elbow gap + 2 x (gap between seat and cabin wall).	**05**	**CO2**
Q4	List mission profile phases of fighter aircraft (in sequential order). [CO3]	**05**	**CO3**
Q5	What do you mean by Reusable launch vehicle?[CO4]	**05**	**CO4**
Q6	Differentiate between launch vehicle and space shuttles. [CO4]	**05**	**CO4**

SECTION B (5x8=40 Marks)

Q 7	Compare mission profiles of different types of aircraft.[CO1]	**08**	**CO1**
Q 8	Which type of Wing, flap, Tail and landing gear configuration is suitable for agricultural aircraft? Justify your selections. [CO2]	**08**	**CO2**
Q 9	Consider a private six-seater aircraft with Cruise Mach number 0.2; cruise altitude 4000 m, wing loading 100 kg/m^2, Takeoff weight 4000 kg. Design the main wing that would be suitable for this aircraft. Compare your results for Mach number 0.8.[CO2]	**08**	**CO2**

Q 10	An airplane under design has the following features: Weight of payload = 23000 N , Weight of 2 crew members = 2000 N, Estimated fuel fraction (W_f/W_O) = 0.367 , Empty weight fraction (We/W_O) = 0.837 $Wo^{-0.7}$; here, W_O is in Newtons. a) Obtain the gross weight (W_O) of the airplane.[CO2]	**08**	**CO2**
Q 11	Why staging is required for launch of spacecraft? [CO4] Or How spacecraft performs Tossback trajectory maneuver? Compare without tossback trajectory. [CO4]	**08**	**CO4**
SECTION-C (1x30=30 Marks)			
Q 12	Design (layout sizing) jet engine powered 100 seater passenger aircraft with following performance requirements: [CO3] Gross still air range = 3,000 km Cruise Mach no. = 0.8 Cruise Altitude = 11,000 m runway length=450m	**30**	**CO3**