Enrolment Number: _ _ _ _ _ _ _

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY (PIET)

B. TECH EXAMINATION (MID SEMESTER)

7th SEMESTER (2022-2023)

Subject Name: Aircraft Design (203101401) Branch: Aeronautical

Date: *03/08/2022* Time: 1:30 hours Total Marks: 40

		Marks
Q.1	(A) Multiple Choice Questions	05

1. Keeping all other factors constant if only range of aircraft is increased then, what will be effect on the gross weight of aircraft?
   a. Gross weight will increase b. Will decrease
   c. Unchanged d. Not depended on range
2. Which of these cannot be considered as design requirement of prop engine?
   a. Range b. Turbine Temperature
   c. Endurance d. Take-off and landing
3. What is the initial phase of an Aircraft Design?
   a. Conceptual Design b. Detail Design
   c. Preliminary Design d. Sizing
4. What will be the weight fraction of the aircraft at final mission segment w.r.t. Wo?
   a. Multiplication of individual weight fraction b. Division of individual weight fraction
   c. Addition of individual weight fraction d. Subtraction of individual weight fraction
5. How will you determrne climb mission weight fraction?
   a. Climb Endurance b. Always constant
   c. Loiter d. Cruise Speed

(B) Fill in the blanks. 05

1) First step to estimate the gross weight Wo to find ..... and ..... so initial W_0 can be guess.

2) The estimation of weight, fuel weight etc, is done by __ process.

3) The main objective of the Preliminary stage is

4) The drawing which represents the rough idea of the actual design is called as

5) The typical range for empty weight fraction is.....

Q.2	Attempt any four (Short Questions)	12

(l) An aircraft with crew and payload of 180kg is flying. If fuel weight fraction is 0.353 and empty weight fraction 0.481 then, what will be the gross weight of aircraft?

(2) A Jet transport aircraft is flying with crew load of 175kg, payload of 1400kg and fuel weight of 500kg. Find out Fuel to empty weight fraction, if design take-off gross weight of the aircraft is 5600lb.

(3) An Aircraft has gross weight of 10000lb. At the end of the mission segment, it has weight fraction as 0.985. Determine fuel consumed for this mission.

(4) A general aviation aircraft is flying with crew load of 1151b,payload of220lb and fuel weight of 1001b.Find out the design take-off gross weight of the aircraft, given 95lb empty weight.

(5) Cessna 172R has total gross weight of the 1110.98kg with fuel capacity of210 kg and weight of crew and passenger is 125kg. Find out empty weight fraction.

Q.3 Attempt any two 08

(1) An aircraft has cruise range of 1500nm and SFC C = 0.5 I/hr. Cruise velocity of jet aircraft is 570 ft/s with LID as 13.2. Aircraft is supposed to do loiter of2 hrs then what should be the gross weight of aircraft? Given, empty weight fraction of 0.55, crew and payload of 6500kg with 0.98 as mission segment fuel fraction for climb, take-off and landing.

(2) What are the different phases of Aircraft Design? Explain them with neat sketch.

(3) What is meant by Mission profile? Draw and Explain mission profile for commercial as well as military aircraft.

Q.4 (A) Define the following 05

| a. Range | b. Endurance | c. Taper ratio ' | d. Aspect ratio | e. Cruise J

(B) Write short notes on Turbojet engine and explain its variation of thrust and TSFC with velocity and altitude. 05

OR

(B) Write short note~ on gliding and climbing flight? 05