

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

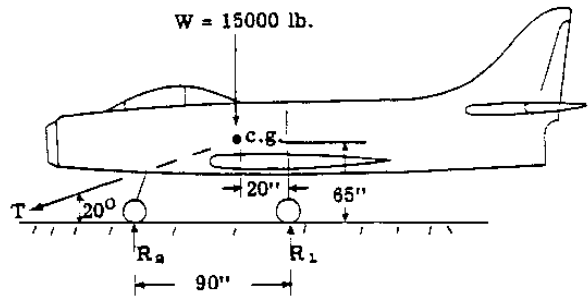
Programme Name: B.Tech ASE Course Name : Aircraft Design Course Code : ASEG461 Nos. of page(s) : 2	Semester : VIII Time : 03 hrs Max. Marks : 100
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Instructions: Make use of sketches/plots to elaborate your answer. Brief and to the point answers are expected
Make use of Aircraft Data Sheet for Q10.

SECTION A

Q. No.	Question	Marks	CO
Q 1	State the importance of Budget and time constraints in Designing of an Aircraft?	4	CO2
Q 2	Define the following terms. (a) Ramp weight (b) Take-off gross weight (c) Operational empty weight (d) landing weight	4	C01
Q 3	A customer wishes to know the effect of increase in ambient temperature by 10° C on the take-off distance of an airplane designed considering ISA conditions. Give suitable estimate considering important factors	4	C03
Q 4	What are the major constraints and standards arises from various mandatory and operational regulations.	4	C01
Q 5	How do Computer Aided Design (CAD) and Computational Fluid Dynamics (CFD) reduce the design cycle time	4	C04

SECTION B

Q 6	<p>The airplane in Fig. 1 is being launched from the deck of an aircraft carrier by the cable pull T which gives the airplane a forward acceleration of 3.25g. The gross weight of the airplane is 15000 lb.</p> <p>a) Find the tension load T in the launching cable, and the wheel reactions R_1 and R_2.</p> <p>b) If the flying speed is 75 MPH, what launching distance is required and the launching time t?</p>	10	C02
 <p style="text-align: center;">Fig. 1</p>			
Q 7	Briefly explain as to how aerodynamic, structural, crashworthiness, manufacturing and	10	C01,

	maintainability considerations influence the design of an airplane		CO5
Q 8	What are the salient features you consider in designing Low and High Speed Aircraft .	10	CO3
Q 9	<p>Assume that performance calculations have been carried out for airplane under design. Plot typical variations with altitude, for the following quantities (a) V_{max} (b) V_{min} (c) $(R/c)_{max}$ (d) landing distance (e) minimum radius of turn.</p> <p>Or</p> <p>A jet airplane with a weight of 441, 450 N and wing area of 110 m^2 has a tricycle type landing gear. Its CL_{max} with flaps is 2.7. Obtain the take-off distance to 15 m screen height and the time taken for it.</p> <p>Given that:</p> <ul style="list-style-type: none"> (i) $V_1 = 1.16 V_s$ (ii) $V_2 = 1.086 V_1$ (iii) C_L during ground run is 1.15 (iv) Drag polar with landing gear and flaps deployed is $C_D = 0.044 + 0.05C_L^2$ (v) Thrust variation during take-off can be approximated as : $T = 128,500 - 0.0929 V^2$; where V is in kmph and T is in Newton 	10	CO3
SECTION-C			
Q 10	<p>Design a Jet Transport Airplane with a Gross Still Air Range (GSAR) of 4000 Km and Single class Seating capacity of 150 Passengers with a cruise Mach number of 0.80 and Altitude 11000 m.</p> <p>Illustrate the category to which the airplanes belong.</p> <p>Calculate the following parameters:</p> <ul style="list-style-type: none"> (i) Preliminary Weight Estimate (ii) Wings Parameters (iii) Empennage Parameters (iv) Control Surface Parameters (v) Fuselage Parameters (vi) Engine Classification (vii) Type of Landing Gear - with justification (viii) Overall Height 	40	CO4