Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH. (AERONAUTICAL ENGINEERING)

END SEMESTER EXAMINATIONS, JUNE 2017

SUBJECT: AIRCRAFT DESIGN-II [AAE 3201]

REVISED CREDIT SYSTEM
(15/06/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. Explain the different types of loads acting on the aircraft. **(3)**

1B. The airplane equipped with the float is catapulted into the air from a navy cruiser as shown in fig.(i) The catapulting force P gives the airplane a constant horizontal acceleration of 96.6 ft/sec^2.The gross weight of airplane is 9000 lbs and the catapult track is 35 ft long. Find the catapulting force P. The engine thrust is 900 lb. **(3)**

1C. For the above problem (1B), find the reactions R_1 & R_2 from the catapult car. Also find the airplane velocity at the end of track run? **(4)**

2A. Write a short note on aircraft engine materials. **(3)**

2B. Fig. (ii) shows the landing gear structure; the brace members BC and BF are two force members. The fitting at E provides resistance V, D & S reactions but only moment resistance about V axis. Draw the space force diagram. **(3)**

2C. For the above problem (2B), find reactions at E and loads in members BF and BC under given wheel loading. **(4)**

3A. Write a short note on beam column. **(3)**

3B. What do you understand by anticlastic and synclastic surfaces? **(3)**

3C. A 10-mm thick plate is subjected to bending moments M_x equal to 10 Nm/mm and M_y equal to 5 Nm/mm. Calculate the maximum direct stresses in the plate. **(4)**

4A. Discuss the practical steps for wing airfoil section selection. **(3)**

4B. How does the wing vertical location affects the wing design process. List their advantages and disadvantages. **(3)**

4C. List any four advantages and disadvantages of high wing aircraft. **(4)**

5A. Explain the effect of wing sweep on the following: Lift curve slope, C_{Lmax}, induced drag and drag divergence Mach number. **(3)**

5B. Why elliptical lift distribution is very important in wing design? **(3)**

5C. A jet fighter aircraft has a wing area of S = 47 m^2, aspect ratio AR = 7, and taper ratio of 0.8. It is required that the 50 percent chord line sweep angle be 42 degrees. Determine tip chord, root chord, mean aerodynamic chord, span, and effective span, as well as leading edge sweep, trailing edge sweep and quarter chord sweep angles. **(4)**

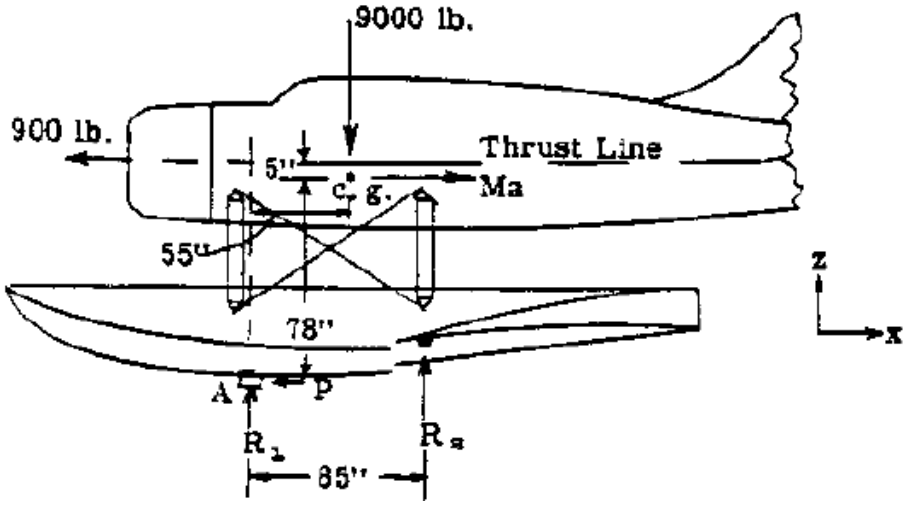

Fig (i)

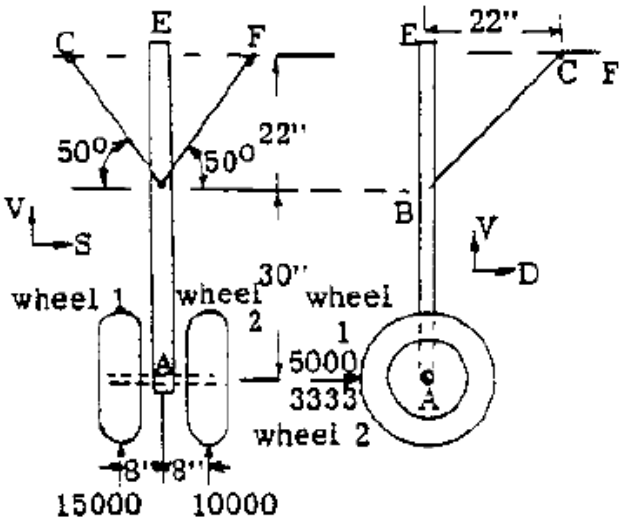

Fig (ii)