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Question Paper Code: AAE011



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech V Semester End Examinations (Supplementary) - January, 2019

Regulation: IARE – R16

AIRCRAFT PERFORMANCE

Time: 3 Hours

(AE)

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

- (a) Explain about the three common altimeter datum settings that are used in the measurement of height with a neat sketch. [7M]

(b) Show how the temperature and height are related in the standard atmosphere model and explain with a neat sketch. [7M]
- (a) What are the performance parameters that are to be estimated when designing an airplane. Also, explain how each parameter could be found. [7M]

(b) Explain aircraft performance analysis. Name two aspects of airplane performance that are significantly affected by the critical Mach number of the wing and explain. [7M]

UNIT – II

- (a) Explain the concept of minimum velocity with the help of neat plots and write the equation for the maximum velocity. [7M]

(b) Consider two airplane one is jet propelled another is propeller driven. Explain the procedure for determining the velocity graphically for these airplanes? [7M]
- (a) Explain the constant angle of attack, constant Mach no cruise method. [7M]

(b) Show that coefficient of drag due to zero lift is equal to one third of the coefficient of drag due to lift, using this condition derive the equation for velocity at power required minimum. [7M]

UNIT – III

- (a) Construct an expression to estimate the maximum rate of climb and illustrate the maximum rate with a neat sketch showing the climb performance at a given altitude. [7M]

(b) Explain briefly the methods to measure the best climb performance. Why climb performance is one of the critical areas in both the design and operation of an aircraft? [7M]

6. (a) Discuss how each of the aerodynamic characteristics in turn affect the performance characteristics of the airplane. [7M]
- (b) Calculate the angle of glide of an airplane against wind 30km/hr if it glides a horizontal distance of 20km for every 500m of the vertical fall in still air in which case given that the speed of gliding is 80km/hr. [7M]

UNIT – IV

7. (a) Define Maneuver and Turning performance. Explain the V-n (Maneuver) diagram of an aircraft. [7M]
- (b) Define load factor. What are its values in [7M]
- i. Level flight
 - ii. Free fall
 - iii. In a turn of radius 200 m at a speed of 100 m/s
 - iv. At the bottom of a loop of radius 200 m at a speed of 100 m/s?
8. (a) Explain the concepts of [7M]
- i. Buffeting
 - ii. Sonic boom
- (b) An airplane cruising at sea level with velocity 150 m/s. Assume that the weight of the fuel is constant. The total weight of the aircraft is one tenth of the lift of the aircraft. Calculate turn rate and turn radius for the level turn at this velocity. [7M]

UNIT – V

9. (a) Define the term flight planning. Discuss the four phases of the flight planning with a neat sketch. [7M]
- (b) Explain the effects on the takeoff distances of the below flight variables. [7M]
- i. Aircraft weight
 - ii. Head wind
 - iii. Atmosphere effects
 - iv. Runway conditions
10. (a) Explain the [7M]
- i. Landing performance measurement
 - ii. Take-off performance measurement
- (b) Explain the terms trip fuel and diversion fuel and Explain the need of 'trip fuel' and 'the diversion fuel'. [7M]

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