

CBCS SCHEME

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Third Semester B.E. Degree Examination, Jan./Feb. 2023 Elements of Aeronautics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Draw a neat sketch of a typical aircraft and mention the propose of each part. (10 Marks)
b. What are high lift devices? Explain with the help of sketches. (10 Marks)

OR

- 2 a. Draw a neat sketch of a typical wing and mention the purpose of each part. (12 Marks)
b. Explain the desirable properties for aircraft. (08 Marks)

Module-2

- 3 a. What are the forces acting on aircraft? Explain drag in detail. (10 Marks)
b. Determine the standard atmospheric values of density, temperature at a geopotential altitude of 15km. (10 Marks)

OR

- 4 a. Define the following terms : Aerodynamic center, center of pressure, aspect ratio, Mach Number. (10 Marks)
b. The pressure at a point on wing of an airplane flying at a velocity of 70m/s in the conditions associated with a standard altitude of 2km is $7.58 \times 10^4 \text{N/m}^2$. Calculate the pressure coefficient at that point on the wing. Sea level values of density, temperature and pressure are respectively, 1.225kg/m^3 , 288.16 K and 1 bar. Take $\alpha = -6.5 \text{k/KM}$. (10 Marks)

Module-3

- 5 a. Explain the aircraft classification based on power-plant location. (10 Marks)
b. Compare the merits and demerits of turbojet and turbofan engines. (10 Marks)

OR

- 6 a. Describe with neat sketch the working of turboprop engine. (10 Marks)
b. Explain the Ramjet with neat sketch. (10 Marks)

Module-4

- 7 a. Explain the lateral stability with neat sketch. (10 Marks)
b. Explain the purpose of Tabs in aircraft. (10 Marks)

OR

- 8 a. Explain the turn performance and derive the relations for the radius of turn and turn rate. (10 Marks)
b. The maximum L/D of an airplane is 15. Calculate the minimum glide angle and maximum range measure along the ground by airplane in a power off glide at altitude of 4000m. Also calculate equilibrium glide velocity. Given density at 4km altitude is 0.8193kg/m^3 , gross weight of airplane is 1360kg, wing surface area is 17m^2 and $C_L = 0.65$. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-5

- 9 a. Describe typical hydraulic system with neat sketch. (10 Marks)
b. Describe a typical pneumatic system of an aircraft with neat sketch. (10 Marks)
- OR
- 10 a. Explain FBW with a neat sketch. (10 Marks)
b. Explain the inertial navigation system employed in aircraft. (10 Marks)
