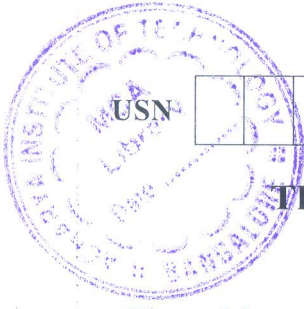


CBCS SCHEME



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18AE34

Third Semester B.E. Degree Examination, June/July 2024 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. Briefly explain the airplane components and their functions with neat sketch. (10 Marks)
- b. Sketch the typical wing and fuselage structures and explain briefly about the components and their functions. (10 Marks)

OR

- 2 a. Briefly explain the aircraft axis system and the aircraft motion with neat sketch. (10 Marks)
- b. Bring out various the metallic and non-metallic materials used for aircraft application. (10 Marks)

Module-2

- 3 a. Derive an expression for the variation of temperature, pressure and density with respect to altitude in isothermal and thermal gradient layer in atmosphere. (10 Marks)
- b. Calculate the standard atmosphere value of temperature pressure and density at a geopotential altitude of 14km.
[Take $T_{\text{sealevel}} = 216.6\text{K}$, $P_{\text{sealevel}} = 1.01 \times 10^5 \text{ N/m}^2$, $\rho_{\text{sealevel}} = 1.225\text{kg/m}^3$] (10 Marks)

OR

- 4 a. Derive an expression for Bernoulli's theorem from Newton's second law of motion and list out some of the applications. (10 Marks)
- b. Sketch and explain the lift curve for symmetric and unsymmetrical airfoils. (10 Marks)

Module-3

- 5 a. Draw the p-v and t-s diagram for the Brayton cycle and explain the salient features of the graph. Also derive the expression for efficiency and explain its application to jet engine. (10 Marks)
- b. With neat sketch, briefly explain the working principle of turbo jet engine. (10 Marks)

OR

- 6 a. Discuss about the turbofan engine and also explain the effect of latitude and airspeed on Thrust. (10 Marks)
- b. Briefly describe about the turbo prop engine with neat diagram and explain its working principle. (10 Marks)

Module-4

- 7 a. Define stability and briefly explain the criteria for longitudinal static stability with neat sketch. (10 Marks)
- b. Derive an expression for turn rate and radius of turn for a pull up, pull down and level turn manoeuvres. (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.

OR

- 8 a. Draw a plot between Thrust required and velocity and explain the condition for minimum thrust required and also explain the effect of altitude on thrust required curves. (10 Marks)
- b. Define gliding flight. Write an expression for gliding angle and bringout the condition for minimum gliding angle. (10 Marks)

Module-5

- 9 a. With neat sketch, describe the components and working principle of a typical aircraft Hydraulic system. (10 Marks)
- b. Explain about the fuel system of an aircraft and describe the types with simple sketch. (10 Marks)

OR

- 10 a. Discuss about the components and working principle of a typical aircraft pneumatic system. (10 Marks)
- b. With suitable diagram, explain the flight control system of an aircraft. (10 Marks)
