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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 typical aircraft and explain the function of each component. (10 Marks)
b. With a neat sketch of aircraft axis system, explain the aircraft motions. (10 Marks)

OR

- 2 a. Draw a neat sketch of a typical wing and explain the function of each part. (10 Marks)
b. Elucidate the desirable properties for aircraft structure. (10 Marks)

Module-2

- 3 a. Define standard atmosphere. Explain the variation of pressure, temperature and density with the increase in altitude with the help of graphs. (10 Marks)
b. Determine the standard atmospheric values of density, temperature and pressure at a geo-potential altitude of 13km. Assume std. sea level pressure, temperature and density. Take lapse rate -6.5°K/Km and $R = 287\text{J/Kg K}$. (10 Marks)

OR

- 4 a. Define the following terms : i) Center of pressure ii) Aerodynamic center iii) Chord iv) Parasite drag v) Aspect ratio. (10 Marks)
b. Consider an airplane with wing surface area 16m^2 and span 8m, generating a lift of 8000Kg. For a flight velocity of 120m/s at std sea level. Calculate the lift coefficient, induced drag coefficient and induced drag. Assume $e = 0.8$ and $\rho_{\text{SL}} = 1.225\text{Kg/m}^3$. (10 Marks)

Module-3

- 5 a. Elucidate the advantages based on different power plant locations. (10 Marks)
b. Illustrate the differences between Piston engine and jet engine. Also draw the working cycle involved. (10 Marks)

OR

- 6 a. Explain the working of turbo prop engine with a neat sketch. (10 Marks)
b. Compare the pulse jet and ramjet with neat sketches. (10 Marks)

Module-4

- 7 a. What are the ways of achieving lateral stability? Explain any one in detail with sketches. (10 Marks)
b. Explain the purpose of various tabs in aircraft. (10 Marks)

OR

- 8 a. Derive the necessary relations for Glide and Turn maneuvers with neat sketches. (12 Marks)
b. Explain aerobatic maneuvers with sketches. (08 Marks)

Module-5

- 9 a. Explain the working of a typical hydraulic system with a neat sketch. (10 Marks)
b. Explain different types of fuel systems employed in aircraft. (10 Marks)

OR

- 10 a. Explain the electronic flight instrument system. (10 Marks)
b. Explain the communication system with a neat sketch. (10 Marks)

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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.