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18AE34

Third Semester B.E. Degree Examination, July/August 2022
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 function with sketch. **(10 Marks)**

b. Sketch the typical wing and fuselage structures and explain briefly about the components and their function. **(10 Marks)**

OR

2 a. Briefly explain the aircraft axis system and the aircraft motion's with neat sketch. **(10 Marks)**

b. Bring out various metallic and non-metallic materials used for aircraft application. **(10 Marks)**

Module-2

3 Calculate the standard atmospheric value of temperature, pressure and density at a geo potential altitude of 14 km. **(20 Marks)**

OR

4 Sketch and explain the lift curve and drag curve (C_L and C_D Vs AOA) for the following airfoils:
(i) Symmetrical airfoil. (ii) Unsymmetrical airfoil. **(20 Marks)**

Module-3

5 a. With neat sketch, briefly explain the working principle of Turbojet engine. **(10 Marks)**

b. Briefly describe about the Turbo Prop engine with neat diagram and explain its working principle. **(10 Marks)**

OR

6 a. Discuss about the working principle of Turbo fan engine and also explain the effect of altitude on Thrust. **(10 Marks)**

b. Draw the PV and t-s diagram for Brayton cycle and explain the salient features of graph. Also, derive the expression for efficiency. **(10 Marks)**

Module-4

7 Derive an expression for turn rate and radius of turn for the following cases:
(i) Pull up (ii) Pull down (iii) Level turn maneuver **(20 Marks)**

OR

8 Define static and dynamic stability. Briefly explain the criteria for longitudinal static stability of an aircraft with neat sketch. **(20 Marks)**

Module-5

9 With neat sketch, describe the components and working principle of a following system:
(i) Aircraft hydraulic system. (ii) Aircraft fuel system. **(20 Marks)**

OR

10 a. Discuss about the working principle of typical aircraft pneumatic system. **(10 Marks)**

b. With suitable diagram and explain the flight control system of an aircraft. **(10 Marks)**

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