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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. Describe the development of airplane from their beginning stages. (10 Marks)
b. List out the different parts of an airplane and state the purpose of each component for the successful flight. (10 Marks)

OR

- 2 a. Discuss in detail with the help of sketches, construction of a typical wing and fuselage structure. (10 Marks)
b. What are Biplanes and Monoplanes? Write the advantages and disadvantages of Biplane over Monoplane. (10 Marks)

Module-2

- 3 a. Define speed of sound and prove that,
 $a = \sqrt{\gamma RT}$. (10 Marks)
b. Explain Bernoulli's principle, and prove that
 $P_1 + \frac{1}{2} \rho V_1^2 = P_2 + \frac{1}{2} \rho V_2^2$. (10 Marks)

OR

- 4 a. Sketch a typical airfoil and explain how lift, drag and moment are generated when facing a prestream. What is the effect of angle of attack on the pressure distribution on surface of the airfoil? (15 Marks)
b. Define Mach Number. How it is related to the temperature of the medium? What is the effect of Mach number on the drag of an airfoil. (05 Marks)

Module-3

- 5 a. Sketch a schematic diagram of a turboprop engine, mark all the sub-systems and explain their functions. What are the limitations of turboprop engine? (10 Marks)
b. Compare advantages and disadvantages of turbojet, turboprop and turbofan engines. (10 Marks)

OR

- 6 a. With the help of diagram, explain the working and operation of turbojet engine. (10 Marks)
b. Describe a ramjet engine and compare its working principle with SCRAMJET and turbojet engines. (10 Marks)

Module-4

- 7 a. With suitable diagrams, describe details about static and dynamic stability. (10 Marks)
b. Describe in detail, with suitable diagram, longitudinal stability and lateral stability. (10 Marks)

OR

- 8 a. Explain with neat sketches of the following :
- (i) Landing of an aircraft (10 Marks)
 - (ii) Gliding of an aircraft. (10 Marks)
- b. With neat diagram, explain the difference between the effects of flaps and slats on lift. (10 Marks)

Module-5

- 9 a. Enumerate basic instruments used for flying an aircraft. (05 Marks)
- b. Explain with neat sketch the construction and working of an airspeed indicator. (15 Marks)

OR

- 10 a. Explain about the pneumatic system components used in aircraft in detail. (10 Marks)
- b. What are the basic methods of cooling the cabin air? Describe in detail with neat diagram. (10 Marks)
