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## Third Semester B.E. Degree Examination, Dec.2019/Jan.2020 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. Explain with neat sketch, the air craft motions. (10 Marks)
- b. Explain with neat sketch, the principle operation of helicopter, their parts and functions. (10 Marks)

**OR**

- 2 a. Explain with neat sketch Monoque, semimonoque and truss structure of aircraft. (10 Marks)
- b. Explain in details with application metallic and non-metallic materials used in aircraft. (10 Marks)

### Module-2

- 3 a. Write a details about the airfoil nomenclature, with sketches. (10 Marks)
- b. Explain (i) Aerodynamic Centre (ii) Centre of Pressure (iii) Aspect Ratio. (10 Marks)

**OR**

- 4 a. Explain with neat graph lift-curve and Drag curve. (12 Marks)
- b. An airfoil of chord length 2m and span 15m has an angle of attack  $\alpha = 6^\circ$ . The airfoil is moving with a velocity of 80m/sec in air whose density is  $1.25\text{kg/m}^3$ . Find the weight of the airfoil and the power required to drive it. The value of coefficient of drag and lift are 0.03 and 0.5 respectively. (08 Marks)

### Module-3

- 5 a. Describe principle of operation of Turbofan engine with neat diagram. (10 Marks)
- b. Compare merits and demerits of Turbo prop Turbojet and Turbofan engine. (10 Marks)

**OR**

- 6 a. Explain with neat sketch Brayton cycle and its applications in jet engine. (10 Marks)
- b. What is thrust augmentation? Explain different types of thrust augmentation method. (10 Marks)

### Module-4

- 7 a. What is Stability? Explain with neat sketch static and Dynamic stability. (10 Marks)
- b. Explain with neat diagram: i) Flap and Slats ii) Control Tabs. (10 Marks)

**OR**

- 8 a. Explain with neat sketch Turning flight performance. (10 Marks)
- b. Explain with neat graph i) Power curve ii) Maximum and Minimum speed for horizontal flight at a given attitude. (10 Marks)

### Module-5

- 9 a. Explain with neat diagram aircraft fuel system. (10 Marks)
- b. Explain in details oxygen system requirements. (10 Marks)

**OR**

- 10 a. With the help of block diagram, explain light aircraft electrical system. (10 Marks)
- b. Write short notes on : i) Air Speed Indicator ii) Accelerometer. (10 Marks)