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10AE45

Fourth Semester B.E. Degree Examination, Dec.2013/Jan.2014
Elements of Aeronautics

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART - A

- 1 a. Explain with a neat sketch the basic components of a Helicopter. How the torque reaction is overcome in a no tail rotor type of twin mass main rotors? (10 Marks)
- b. Explain major components of a propeller aircraft. (10 Marks)
- 2 a. Show the temperature variation against altitude upto 100 km in atmosphere. Explain different regions. (10 Marks)
- b. In the region of linear variation of temperature in troposphere, derive the ratio of pressure and density in terms of temperature ratios. (10 Marks)
- 3 a. Explain the forces acting on a typical airfoil in flight with vector diagram. (10 Marks)
- b. Explain pitching, rolling and yawing with sketches. (10 Marks)
- 4 a. State and explain the three laws of Kepler about planetary motion. (10 Marks)
- b. For an aircraft in steady state flight, find out the stalling speed with weight of 711.235 N, density of 0.738 kg/m^3 , and wing surface area of 145 m^2 and maximum lift coefficient of 1.4. (10 Marks)

PART - B

- 5 a. Explain with sketches, the role of stringers, spar, aileron and wing flaps. (10 Marks)
- b. Explain the different types of structures of fuselage warren truss, monocoque and semimonocoque design with sketches. (10 Marks)
- 6 a. Compare Internal Combustion Engines (ICE) with Gas Turbine Engines (GTE) with the help of a sketch and operation. (10 Marks)
- b. Explain the working principle of a rocket along with their types. (10 Marks)
- 7 a. What are the different types of services operated by a typical hydraulic system in aircraft with sketch? (10 Marks)
- b. Describe the pressurization system of an aircraft. Mention the salient components. (10 Marks)
- 8 a. Explain with a sketch conventional push pull rod flight control system of an aircraft. (10 Marks)
- b. What are the functions of instruments in an aircraft flight? List important instruments. (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.