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10AE45

Fourth Semester B.E. Degree Examination, June/July 2015
Elements of Aeronautics

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Write a brief note on historical development in aeronautics. (10 Marks)
b. What is a helicopter? Explain its working principle with a neat diagram, explaining all the parts. (10 Marks)
- 2 a. How do you classify aircrafts? Draw a neat flow chart and explain them in brief. (06 Marks)
b. Differentiate between symmetric and cambered airfoil. (04 Marks)
c. Define the following and draw diagrams wherever necessary:
i) Airfoil ii) Angle of attack iii) Aerodynamic centre iv) Centre of pressure
v) Mean camberline. (10 Marks)
- 3 a. Derive the relation between temperature, pressure and attitude. (10 Marks)
b. Draw the simple planform of a convectional wing. Describe the various geometric parameters associated with it. (10 Marks)
- 4 a. Prove that the Newton's second law of motion and Lagrange's equation are equivalent. (10 Marks)
b. State the three laws of Kepler, governing the planetary motion and prove the third law. (10 Marks)

PART – B

- 5 a. Draw the stress-strain diagram of a metallic material used in an aircraft, naming the parts and regions. Compare it with a composite material. (10 Marks)
b. Briefly explain various metallic and non-metallic materials used in aircraft. (10 Marks)
- 6 a. Explain characteristics of liquid propellant rocket engine. (05 Marks)
b. What are the advantages of the turboprop over the turbojet engine? (05 Marks)
c. What are the broad classifications of rocket engines? With a neat sketch, explain solid propellant rocket engine. (10 Marks)
- 7 Draw and explain the components of a hydraulic and pneumatic system in an aircraft. (20 Marks)
- 8 a. With a neat sketch, explain push-pull control rod system. (10 Marks)
b. Briefly explain instrument flight rules in an aircraft. (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.