Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

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B.Tech.(ANE)/(Aerospace Engg.) (2012 Onwards) (Sem.–3)

AERODYNAMICS- I

Subject Code : ANE-203

M.Code : 60502

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

(a) Pathline

(b) Potential flow

(c) Conservation equations

(d) Centre of pressure

(e) Aerodynamic force

(f) Lift coefficient

(g) Pressure coefficient

(h) Steady-incompressible flow

(i) Two dimensional flow separation

(j) Boundary Layer

SECTION-B

2. Define circulation, angular velocity, vorticity and time rate of strain of a fluid element in three-dimensional space.

3. Starting from the first principle. Derive Euler Equation of motion.

4. Describe Doublet flow. Derive the velocity potential and stream function for it.

5. Explain, why a laminar boundary layer separates more easily than a turbulent boundary layer.

6. Derive an expression for velocity potential and stream function for a vortex flow.

SECTION-C

7. Show that the pressure coefficient around a circular cylinder placed in an ideal, incompressible flow is given by : $C_p = 1.-4 \sin^2 \theta$. Where 'θ' is the angular coordinate on the surface of the cylinder measured from the lagging stagnation point.

8. Derive an expression for 2-D continuity equation applicable to compressible, viscous, non-uniform and unsteady flows. What are the advantages of integral form of continuity equation over the differential form?

9. Write short notes on the followings :

   (a) Kantian's Integral equation

   (b) Blasius solution for a flat plate

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.