Roll No. ☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

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.