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18C101

B. Tech. EXAMINATION, 2020

(Third Semester)

(C Scheme) (Main & Re-appear)

(AER)

AER201C

Elements of Aerodynamics

Time : 2½ *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a) What is the meaning of Incompressible and Compressible Law ?

(b) Explain the Non-Dimensional Number Mach Number, Reynold Number.

2. Explain the streamlines, Pathlines, Streaklines. Explain the Pitot Static Tube for the measurement of Air Speed with the neat sketch.

3. (a) Explain the Divergence and Curl of Vector Field.

(b) Derive the relationship between Volume Integral and Surface Intergral.

4. (a) Derive the Bernoulli's Theorem. Mention the assumptions made.

(b) The water with a velocity of 15 m/sec and under a pressure of 300 kPa. If the height above the datum is 30 m, calculate the total energy per unit weight of water.

5. (a) What do you mean by Stream Function and Potential function ?

(b) Derive the relationship between Vorticity and Circulation.

6. For a doublet of strength 20 m^2/sec, calculate the velocity at the point P (1, 2) and the value of stream function passing through it.

7. Derive Prandtl's boundary layer equation with all assumptions.

8. Determine the displacement thickness and momentum thickness in terms of the nominal boundary layer thickness δ in respect of the following Velocity profiles in the boundary layer on a flat plate :

$$U/U_0 = 2\ (y/\delta)-(y/\delta)^2.$$