

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 148666

Roll No. 

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**B.TECH.**

**Theory Examination (Semester-VI) 2015-16**

**AERODYNAMICS-I**

*Time : 3 Hours*

*Max. Marks : 100*

**1 Attempt all parts. All parts carry equal marks Write answer of each part in short (Max. 30 words)**

(2×10=20)

- Section-A**
- (a) Define “Centre of Pressure”.
  - (b) Define “Aerodynamic Centre.”
  - (c) What is Bulk Modulus ?
  - (d) What is the formula for Mach No ?
  - (e) What are irrotational flows ?
  - (f) Write down the equation for coefficient of lift.

- (g) What is skin friction drag ?
- (h) Write down relation between circulation and vorticity.
- (i) Define pitching moment.
- (j) What is vortex flow ?

### Section-B

**2. Attempt any five questions from this section:**

(5×10=50)

- (a) Explain Laminar and Turbulent Boundary flow.
- (b) Explain Poiseuille flow for circular pipe and find the shear stress and flow rate.
- (c) Find the general solution of Navier-stokes equations for viscous flow.
- (d) Explain source, sink, uniform and doublet flow.
- (e) The velocity profile is given as

$$\vec{V} = ax(1+bt)i + cyj$$

Where  $b = 0.2$  per sec and  $a = c = 1$  per sec.

Find the path line and stream line equations.

- (f) State and explain the Kutta-Joukowski theorem for List.
- (g) Explain the thin Aerofoil theory and find the value of  $\gamma(\theta)$  for symmetric aerofoil.
- (h) Explain combination of elementary flows and explain flow over half Rankine oval.

### Section - C

**Attempt any two questions from this section : (2×15=30)**

3. Explain Prandtl-Meyer expansion flow past two dimensional concave corners.
4. Describe about oblique shock waves and expansion waves.
5. Write short notes on any three of the following :
  - (a) Cocielte flow
  - (b) Supersonic flow through constant area ducts
  - (c) Hodograph shock polars
  - (d) Symmetrical and cambered airfoils
  - (e) Aerodynamic coefficients