NAME_____ ROLLNO_____

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-2006

**III B.TECH I SEMESTER REGULAR EXAMINATIONS**

**AERODYNAMICS-II**

**(AERONAUTICAL ENGINEERING)**

**NOVEMBER 2006**

**TIME-3HOUR**

**MARKS-80**

**ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS.**

1. Explain the Importance of aerodynamics in the design of aircraft? Also discuss about the some non-aeronautical applications of aerodynamics?

2. Show that integral conservation form of the momentum equation can be used to estimate the drag over a 2D body?

3. Mention the various applications of Bernoulli's equation? Explain the functioning and applications of pitot-static probe with a neat sketch?

4. Derive the stream function and velocity potential function for a double flow? Sketch the stream line pattern?

5. (a) Define an airfoil? Draw a neat sketch?

(b) Define Chord, Camber, Mean camber line, Leading edge radius and Thickness of an airfoil? Draw a neat sketch of the airfoil by showing all these features?

6. The camber line of a thin circular arc airfoil is given by $Z/c = 4c(x/c)[1-(x/c)]$. Find the lift coefficient and the moment at the quarter chord point by using thin airfoil theory.

7. State the Helmholtz's theorems? Explain the philosophy of the Prandtl's lifting line theory?

8. Consider an airplane that weighs 14,700 N and cruises in level flight at 300 km/h at an altitude of 3000 m. the wing has a surface area of 17 square meters and an aspect ratio of 6.2. Assume that the lift coefficient is a linear function of the angle of attack and $aL = 0 = -1.2$. If the load distribution is elliptic, calculate the value of the circulation at the centre of the wing, the downwash, induced drag coefficient? Take density value at 3000 m is 0.74225 kg/ m