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BAS-012

00945

B.TECH. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

June, 2012

BAS-012 : AERODYNAMICS - I

Time : 3 hours *Maximum Marks : 70*

Note : *Answer **any seven** questions.*

1. (a) What is the difference between Eulers' model and Navier stokes model of equations ? Write the generic form of Navier stocks model. **6**

   (b) Write the Bernounllis' equation for incompressible flow. **4**

2. (a) Draw and explain the concept of subsonic - supersonic flow through the Convergent - Divergent (CD) nozzle. Also show the variation in properties along the length of the nozzle. **6**

   (b) Explain supersonic flow over the nose of a blunt body. **4**

3. (a) Derive the momentum equation in non-dimensional form for nozzel flow. **4**

   (b) With the help of a neat sketch, briefly explain the flow in a C-D nozzle. **6**

4. Answer *any five* of the following questions in briefy : 5x2=10

(a) Distinguish between Ideal and Real fluids.

(b) What are the applications of thin aerofoil theory ?

(c) Why is it that liquid flows are incompressible ?

(d) Write the general form of energy equation for a two dimensional flow.

(e) What are the applications of lifting line theory ?

(f) How is horse shoe vortex formed ?

(g) What is meant by complex potential function ?

(h) What is the significance of the Continuity Condition ?

5. (a) What are the characteristics of a vortex flow ? State and prove Kutta - Jonkowskis' theorem. 6

(b) Explain how a flow over a circular cylinder can be transformed into a flow over a flat plate using Jonkowskis' transformation. 4

6. (a) Determine the condition when the velocity components $u = ax + by$ and $v = cx + dy$ will satisfy the equation of continuity. Also find the magnitude of vorticity. 6

(b) Briefly explain the terms substantial derivative, convective derivative and local derivative. 4

7. (a) Derive the temperature equation for an incompressible flow in partial differential form. 6

(b) How is flow over a cone different from flow over a wedge ? 4

8. (a) Draw a neat sketch of a supersonic wind tunnel circuit and explain the function of each component. 6

(b) What are the assumptions used in linearised two - dimensional supersonic theory ? 4

9. Write short notes on ***any two*** : 2x5=10

(a) Magnus effect

(b) Boundary Layer

(c) Pitching moment

(d) Finite wing