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EAE 021

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

PAPER ID : 148655

Roll No. | | | | | | | | | |

B.Tech.

(SEM VI) THEORY EXAMINATION 2014-15

AERODYNAMICS - I

Time : 2 Hours]   *[Total Marks : 50*

Note: Attempt all the questions.

1. Attempt any one of the following :   10x1=10

    a) Show a combination of source and uniform stream to generate flow around a profile called half body. Present the work out with sketches/plots/diagrams.

    b) Explain the Kutta-Joukowski theorem. How it is helpful.

2. Attempt any two of the following :   5x2=10

    (a) Derive the fundamental equation for thin airfoil theory mention the assumptions made.

    (b) Develop Prandtl relation for a normal shock and explain its significance.

    (c) Compare Normal shock wave and Oblique shock wave. Obtain Normal shock equations.

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3. Attempt any two of the following: 5x2=10

   (a) Derive equation for the stream function ψ and velocity potential ϕ for a vortex flows.

   (b) What is meant by one dimensional flow? Obtain momentum equation for quasi-one dimensional flow.

   (c) Derive a relation between the flow Mach number and the characteristic Mach number for adiabatic flow condition.

4. Attempt any two of the following: 5x2=10

   a) Differentiate between Shock waves and Expansion waves.

   (b) Discuss how the streamline pattern and aerodynamic coefficients over an airfoil are influenced by deflection of flap.

   c) Compare subsonic & supersonic flows. With the help of neat sketches explain using the example of subsonic and supersonic flows over a wedge.

5. Attempt any two of the following: 5x2=10

   a) With neat diagrams explain Couette flow.

   (b) With necessary diagrams explain what do you mean by boundary layer and displacement thickness?

   c) Obtain Navier-Stokes equations for a compressible unsteady three dimensional viscous flow. Where it is useful.

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