CBCS SCHEME

USN | | | | | | | | | |

15AE832

Eighth Semester B.E. Degree Examination, June/July 2019
Boundary Layer Theory

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define with suitable equations :
i) Velocity of the fluid particles
ii) Acceleration of the fluid particle
iii) Newton's law of viscosity. **(08 Marks)**

b. Sketch the flow over aerofoil and explain the flow around cylinder with a suitable equation. **(08 Marks)**

OR

2 a. Establish the equation of continuity usual notations. **(08 Marks)**

b. Give the physical importance fo the following non dimensional parameters in brief (with suitable equations)
i) Reynolds number
ii) Parandtl number. **(08 Marks)**

Module-2

3 a. Define the stagnation point flow and state equations for :
i) velocity distribution
ii) pressure distribution, in the case of two dimensional flow. **(08 Marks)**

b. Explain coquette flow with a reference to non-zero pressure gradient taking suitable equations and suitable diagram. **(08 Marks)**

OR

4 a. Establish the equation for velocity distribution in Poiseuillel's flow. **(08 Marks)**

b. Describe an unsteady flow between plates with bottom injection and top section. **(08 Marks)**

Module-3

5 a. Draw a laminar boundary layer and derive the equations in it. **(08 Marks)**

b. Derive displacement thickness and momentum thickness for a boundary layer of a two dimensional flow. **(08 Marks)**

OR

6 a. Derive momentum integral equation. **(10 Marks)**

b. Define :
i) thermal boundary layer
ii) forced convection. **(06 Marks)**

Module-4

7 a. Derive Falker–Skan differential equation with a reference to boundary layer equations for a plane steady incompressible flow. **(12 Marks)**

b. What is Reynold's analogy? **(04 Marks)**

OR

8 a. Demonstrate similarity solution to boundary layer equation for steady two dimensional flow. **(08 Marks)**

b. Explain Blasius solution for flat plate. **(08 Marks)**

Module-5

9 a. Explain the following :
   i) Temporal instability
   ii) Spatial instability. **(08 Marks)**

b. Explain time averaging and fluctuation in a neat diagram. **(08 Marks)**

OR

10 a. Draw a neat diagram of hot wire anemometer and explain the principle of measurement of turbulence. **(10 Marks)**

b. Write short notes on :
   i) Schlieren methods
   ii) Pressure probe. **(06 Marks)**

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