CBCS SCHEME

15AE832

USN

Eighth Semester B.E. Degree Examination, Aug./Sept.2020
Boundary Layer Theory

Time: 3 hrs.

Max. Marks: 80

Note: *i) For Regular Students: Answer any FIVE full questions irrespective of modules.*
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Show the flow pattern and effects of viscous flow through a circular tube. (06 Marks)
   b. Derive an expression of momentum equation for viscous flow in Cartesian coordinates. (10 Marks)

2 a. Give a important Boundary conditions used in viscous flow problems. (08 Marks)
   b. Describe the dimensionless parameters used in viscous flow. (08 Marks)

Module-2

3 a. Obtain a relation for steady flow between a fixed and moving plates? (08 Marks)
   b. With help of suitable relation, explain a unsteady flow between plates with top suction and bottom injection. (08 Marks)

4 a. What is meant by Poiseuille flow? Derive an expression for Poiseuille flow through ducts. (10 Marks)
   b. Illustrate the plane stagnation flow with suitable relations? (06 Marks)

Module-3

5 a. How do you estimate the boundary layer thickness from velocity profile over a flat plate? (08 Marks)
   b. Determine the displacement thickness for a laminar flow over a flat plate. (08 Marks)

OR

6 a. What are the approximations can be considered for laminar boundary layer? (06 Marks)
   b. Elucidate the thermal boundary layer for laminar flow over a flat plate. (10 Marks)

Module-4

7 a. Derive a two dimensional laminar boundary layer equation for a incompressible flow with boundary conditions and give the noticeable things from simplified set of equations. (10 Marks)
   b. Show the Reynolds analogy as a function of pressure gradient. (06 Marks)

8 a. What is meant by similarity solutions? Give the Blasius solution for flat plate flow. (10 Marks)
   b. With help of Falkner-Skan similarity solution, obtain a boundary layer equation for wedge flows. (06 Marks)

Module-5

9 a. List down steps followed by small disturbance stability analysis. (08 Marks)
   b. How do you characterize the turbulence for a physical fluid flow? Explain it. (08 Marks)

10 a. Describe the type of free turbulent flow with useful flow profiles. (06 Marks)
   b. Illustrate the Schlieren flow visualization technique with neat sketch. (10 Marks)

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