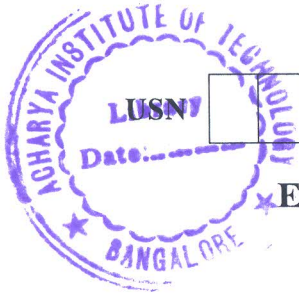


CBCS SCHEME



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 for the following non dimensional parameters in brief (with suitable equations)
i) Reynolds number
ii) Prandtl 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 Couette 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 Poiseuille's flow. (08 Marks)
- b. Describe an unsteady flow between plates with bottom injection and top suction. (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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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 (08 Marks)
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)
