10AE836

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

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a. Briefly explain the viscous flow phenomena for the flow over.
        (i) Thin airfoil   (ii)Circular cylinder.   **(10 Marks)**
    b. Name the Boundary conditions used in viscous flow and explain any two of them. **(10 Marks)**

2   a. Derive the momentum equation for viscous flows.   **(10 Marks)**
    b. Briefly explain the mathematical characterization of basic equations of viscous flows.
                                                                                          (10 Marks)

3   a. Classify the solutions of viscous flow equations.   **(05 Marks)**
    b. Describe the flow between plates with bottom injection and top suction.   **(07 Marks)**
    c. Briefly explain the Poiseuille steady flow through ducts.   **(08 Marks)**

4   a. Mention the Boundary layer properties. Also derive the equation for Displacement
        thickness.   **(10 Marks)**
    b. Briefly, explain the concept of thermal boundary layer with suitable sketch.   **(10 Marks)**

PART – B

5   a. Describe the Blasius solution for flat – plate flow.   **(10 Marks)**
    b. Briefly describe the Reynolds analogy as a function of pressure gradient.   **(10 Marks)**

6   a. Explain the concept of small-disturbance stability in laminar flows.   **(10 Marks)**
    b. Classify and explain the different boundary layer transition processes. Also explain
        Boundary – layer Receptivity.   **(10 Marks)**

7   a. Write a note on physical description of turbulence.   **(10 Marks)**
    b. Explain the fluctuations and time averaging in turbulent flow.   **(10 Marks)**

8   a. Describe the process of measurement of turbulence using hot wire anemometer.   **(10 Marks)**
    b. Explain Schlieren technique of flow visualization.   **(10 Marks)**

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