A–0721

Total Pages : 3 **Roll No. .....**

MT-607

MA/MSC Mathematics (MAMT/MSCMT)

(Viscous Fluid Dynamics-II)

Examination, June 2025

Time : 2:00 Hrs. Max. Marks : 70

Note* :–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

Section–A

(Long Answer Type Questions) 2×19=38

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Discuss the derivation of velocity and thermal boundary layer equations in two-dimensional flow.

2. Discuss the temperature distribution in plane Couette flow with transpiration cooling.

3. Compare and contrast Stokes' flow and Oseen's flow past a sphere.

4. Derive the boundary layer equation for a flat plate (Balsius Topfer solution).

5. Discuss the flow and temperature distribution in a pipe with two concentric rotating cylinders.

Section–B

(Short Answer Type Questions) 4×8=32

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Discuss the temperature distribution in generalized plane Couette flow.

2. Explain Oseen's stream function and its application in fluid dynamics.

3. Define starting flow and explain why it is considered an unsteady motion.

4. Write a short note on the drag force on a sphere in Stokes' flow.

5. Explain the term 'thermal boundary layer' and its importance in heat transfer problems.

6. Derive the equation for temperature distribution between parallel plates.

7. Describe the role of suction/injection through a porous wall in modifying the boundary layer properties.

8. Explain the derivation of velocity and thermal boundary equations in two-dimensional flow.

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