A–1047

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

MT-607

M.A./M.Sc. Mathematics (MAMT/MSCMT)

Viscous Fluid Dynamics-II

Examination, 2026 (Feb.)

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. Two infinite parallel plates are separated by a distance *h*. The lower plate is at rest and the upper plate starts moving suddenly with a constant velocity U.

   (a) Formulate the governing equation for the starting flow.

   (b) Solve the equation to obtain the velocity distribution.

   (c) Discuss the steady-state solution.

2. Consider plane Couette flow between two infinite parallel plates with uniform suction through one porous wall and injection through the other.

   (a) Derive the velocity profile.

   (b) Discuss the effect of suction/injection on the flow field.

3. Derive the equation of energy for viscous incompressible flow.

4. Discuss the plane poiseville flow between two parallel plates.

5. Explain Stoke's flow past a sphere.

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. Write the energy equation for incompressible viscous flow.
2. Define the following :
   (a) Suction
   (b) Injection
   (c) Starting flow
   (d) Boundary layer theory
3. Discuss the temperature distribution in pipe.
4. Write a short notes on steam function.
5. State the assumptions involved in Stokes flow.
6. Write the expression for drag force on a sphere in Stokes flow.
7. What is Ossen's correction ? Why is it needed ?
8. Write the governing equation for starting Couette flow.

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