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MT–602

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

(Viscous Fluid Dynamics–I)

3rd Semester Examination, 2024 (June)

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. Define stoke's law of friction.
2. State and prove Kalvin's circulation theorem.
3. Derive energy equation in term of internal energy and fluid temperature.
4. What is the Hagen-Poiseuille flow find velocity in non-dimensional form.
5. Discuss Stagnation Point flow of a incompressible viscous fluid. (Hiemenz Flow).

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. Explain Mach number and Brinkman number.
2. Derive the equation of continuity in vector form.
3. Describe the relationship between stress and rate of strain components.
4. Define the following
   (a) Lift and Drag coefficient
   (b) Skin friction coefficient

5. State Generalized law of Heat Conduction and thermal conductivity.

6. An oil of specific gravity 0.85 is flowing through a pipe of 5 cm. diameter at the rate 3 1iter/sec. Find the type of flow, if the viscosity for the oil is 3.8 Poise.

7. Explain the physical significance of the Grashoff number and Euler's number.

8. Discuss the plane Poiseuille flow between two parallel plates.

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