S-1055

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MAMT-07

Viscous Fluid Dynamics

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

2nd Year Examination, 2022 (Dec.)

Time : 2 Hours] **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.

SECTION–A

(Long Answer Type Questions)

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.

(2×19=38)

1. Discuss the starting flow in plane Couette Motion.

2. Explain Oseen's flow past a sphere.

3. Obtain Equation of Continuity in Vector form.

4. Define following non-dimensional coefficients.

(a) Lift and drag coefficient.

(b) Skin friction coefficient.

(c) Nusselt number.

(d) Recovery factor.

5. Obtain Navier-Stoke equation of motion.

SECTION–B

(Short Answer Type Questions)

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. (4×8=32)

1. The Velocity field at point is given by $1 + 2y - 3z$, $4 - 2x + 5z$, $6 + 3x - 5y$. Show that it represents a rigid body motion.

2. Deduce Kelvin's Circulation theorem.

3. Define the stress at a point in a fluid and show that it is a symmetric second order tensor.

4. Explain the principle of Dynamic Similarity.

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

6. Discuss the tmperature distribution in Generalized plane Couette flow.

7. Write a short note on characteristic parameters of boundary layer theory.

8. Write short note on :

(a) Viscoscity.

(b) Thermal conductivity.