MAMT-07/MSCMT-07/MAT-203

June - Examination 2026

M.A./M.Sc. (Previous/Final) Examination

MATHEMATICS

Viscous Fluid Dynamics

Paper : MAMT-07/MSCMT-07/MAT-203

[*Time: **3** Hours*] [*Maximum Marks: **80***]

Note :- The question paper is divided into three sections A, B and C. Write answers as per the given instructions in each section.

Section-A **8×2=16**

(Very Short Answer Type Questions)

Note :- Answer **all** questions. As per the nature of the question delimit your answer in one word, one sentence or maximum up to **30** words. Each question carries **2** marks.

1. (i) Write the formula of "Stokes' Law of Friction".

   (ii) Write the statement of Buckingham π-theorem.

   (iii) What is Suction and Injection?

   (iv) Write the formula of Nusselt Number.

   (v) Write one major difference between Oseen's method and Stokes' method.

   (vi) What is a boundary layer thickness 'δ'?

   (vii) What is thermal boundary layer?

   (viii) What is Crocco's first integral?

Section-B **4×8=32**

(Short Answer Type Questions)

Note :- Answer **any four** questions.You have to delimit your each answer maximum up to **200** words. Each question carries **8** marks.

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

3. Deduce Kelvin's circulation theorem.

4. Write a short note on -

   (i) Eckert Number

   (ii) Grashoff Number

5. Explain Plane Poiseuille Flow.

6. Derive the equation for temperature distribution between two concentric rotating cylinders.

7. Explain Oseen's flow past a sphere.

8. Explain the applications of boundary layer theory.

9. Explain asymptotic approach for velocity boundary layer equations.

Section-C **2×16=32**

(Long Answer Type Questions)

Note :- Answer **any two** questions.You have to delimit your each answer maximum up to **500** words. Each question carries **16** marks.

10. Derive the relation between stress and rate of strain components.

11. Derive the mathematical expression for flow due to a rotating disc. (Karman Flow)

12. Calculate the mean temperature over a cross section when wall of the pipe is kept at a constant temperature.

13. Discuss Blasius series solution.
