

MAMT-07/MSCMT-07

December – Examination 2022

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

MATHEMATICS

(Viscous Fluid Dynamics)

Paper : MAMT-07/MSCMT-07

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.

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) Define state of stress at a point.
- (ii) Write the physical importance of Reynold's number.

- (iii) Define plane couette flow.
- (iv) Define Starting flow.
- (v) Define Oseen flow.
- (vi) Write the two applications of boundary layer theory.
- (vii) Write the croccos first integral for $Pr = 1$.
- (viii) Define volume rate of flow.

Section-B **4×8=32**

(Short Answer Type Questions)

Note :- Answer any *four* questions. Each answer should not exceed **200** words. Each question carries 8 marks.

- 2. Explain Stoke's law of friction.
- 3. Derive the expression for circulation.
- 4. Explain the following :
 - (i) Lift and drag coefficients
 - (ii) Nusselt number
- 5. Derive the expression for temperature distribution between two concentric rotating cylinders.
- 6. Explain the Prandtl's boundary layer theory.

- 7. Explain asymptotic approach to solve velocity boundary layer equations in two dimensional form.
- 8. Explain Blasius series solution for large n .
- 9. Discuss the flow between two parallel porous plates.

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 expression for Hagen-Poiseuille flow.
- 11. Derive the expression for Hiemenz flow.
- 12. Derive the expression for Stoke's second problem.
- 13. Derive the expression for temperature distribution in a pipe when the wall of the pipe is kept at uniform temperature gradient.