MA/MSCMT–07

December – Examination 2021

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

MATHEMATICS

(Viscous Fluid Dynamics)

Paper : MA/MSCMT-07

*Time : **1½** Hours*] [*Maximum Marks : **80***

Note :– The question paper is divided into two Sections A and B. Write answers as per the given instructions. Use of non-programmable Scientific Calculator is allowed in this paper.

Section–A **4×4=16**

(Very Short Answer Type Questions)

Note :– Answer any *four* 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 4 marks.

1. (i) Define Normal Strain.

   (ii) State Stoke's law of friction.

   (iii) Write component of viscous stress tensor.

   (iv) Write equation of continuity in spherical polar co-ordinates.

   (v) Define boundary layer.

   (vi) Define starting flow.

   (vii) Define Stoke's stream function.

   (viii) Define displacement thickness and explain its physical interpretation.

Section–B **4×16=64**

(Short Answer Type Questions)

Note :– Answer any *four* questions. Each answer should not exceed **200** words. Each question carries 16 marks.

2. State and prove Buckingham π-theorem.

3. Discuss the flow between *two* parallel plates which are kept at a finite distance apart.

4. Describe Hiemenz Flow.

5. Explain distribution of temperature in a pipe when the wall of pipe is kept at a constant temperature.

6. Explain Oseen' flow past a sphere.

7. Describe boundary layer theory and its applications.

8. Derive boundary layer equations for the flow past a solid plane wall by asymptotic approach.

9. Explain Blasius series solution to the steady boundary layer flow on a flat plate.