

MAMT-07/MSCMT-07

June – Examination 2022

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

MATHEMATICS

(Viscous Fluid Dynamics)

Paper : MAMT-07/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) Write relationship between Viscous stress tensor and Rate of strain tensor.
 - (iii) Write equations of motion of a viscous incompressible fluid motion with constant fluid properties in cartesian coordinates.
 - (iv) Write equations of continuity of a viscous incompressible fluid motion with constant fluid properties in cylindrical polar coordinates and spherical polar coordinates.
 - (v) Write any *four* applications of boundary layer theory.
 - (vi) Define Boundary Layer Thickness.
 - (vii) Define Stagnation Point.
 - (viii) Define Boundary Layer.
2. Write short notes on the following :
 - (a) Reynold's Number
 - (b) Mach Number
 3. Describe flow between two concentric rotating cylinders (Couette Flow).
 4. Describe Stokes' second problem.
 5. Discuss flow between two parallel porous plates.
 6. Explain temperature distribution of plane Couette flow with transpiration cooling.
 7. Discuss Oseen's analysis for the validity of Stokes' equations for the slow motion and derive Oseen's equations.
 8. Write a short note on Thermal Boundary Layer.
 9. Explain Blasius series solution.

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.