293

MA / MSCMT-07

June - Examination 2017

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

Viscous Fluid Dynamics

Paper - MA / MSCMT-07

Time : 3 Hours] **[Max. Marks :- 80**

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

Section - A $8 \times 2 = 16$

(Very Short Answer Questions)

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

1) (i) Define shearing strain.

(ii) Write Navier - Stoke's equation.

(iii) Define Grashoff number.

(iv) Define coefficient of skin friction.

(v) Define stagnation point.

(vi) Write Stoke's equation for slow motion.

(vii) Define boundary layer thickness(δ).

(viii) Define momentum thickness (δ_2).

Section - B

$4 \times 8 = 32$

(Short Answer Questions)

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

2) Explain inspection analysis of the flow of viscous compressible fluid.

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

4) Describe flow between two concentric rotating cylinders (couette flow).

5) Describe flow due to a rotating disc and write Navier - Stokes equation for flow due to a rotating disc.

6) Explain suction in flow between two porous parallel plates.

7) Explain boundary layer and applications of boundary layer theory.

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

9) Explain Blasius series solution.

Section - C $2 \times 16 = 32$

(Long Answer Questions)

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

10) Derive equations of energy for the motion of a viscous compressible Newtonian fluid.

11) Explain :

(i) Stoke's First Problem.

(ii) Stoke's Second Problem

12) Describe temperature distribution in a pipe when wall is at uniform temperature gradient

13) Describe Oseen's flow past a sphere.