Math-4.3

Sl.No. :

Total No. of Pages : 2

Fourth Semester M.Sc. Degree Examination, May - 2025
(SLM Scheme) (Non CBCS)
MATHEMATICS
Fluid Mechanics

Time : 3 Hours **Max. Marks : 80**

Instructions : 1) Answer any five full questions.
2) All questions carry equal marks.

Q1) a) Explain in brief the general motion of fluid element.
b) Describe tensor character of stress matrix.

[8 + 8]

Q2) a) Explain Stoke's law of friction.
b) Write short note on thermal conductivity and generalised law of heat conduction.

[8 + 8]

Q3) a) With usual notation, derive equation of continuity.
b) With usual notation prove equation of state.

[8 + 8]

Q4) Derive the equation of energy for an incompressible viscous fluid. **[16]**

Q5) a) Derive vorticity transport equation.
b) Explain the application of Buckingham π - theorem to viscous compressible fluid motion.

[8 + 8]

Q6) a) State and prove Buckingham π – theorem.
b) Explain Reynolds principles of similarity.

[8 + 8]

Q7) a) Define Poiseuille flow, For such a flow obtain the velocity distribution, average velocity, mass flow rate and skin friction.

b) Obtain the velocity distribution for a generalised plane coulte flow in the form $u = \frac{y}{n} + p\frac{y}{n}\left[1 - \frac{y}{n}\right]$

[8 + 8]

Q8) a) Write short note on stagnation point in two dimensional flow.

b) Obtain the expression for two - dimensional steady incompressible flow with variable viscosity.

[8 + 8]

