M.Sc. (Part-II) (Mathematics) (NEW CBCS Pattern) Sem-III

PSCMTH14 (A) : Optional Paper : Fluid Dynamics-I

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Notes : 1. Solve All **five** questions.
2. All questions carry equal marks.

UNIT – I

1. a) Derive the equation of continuity. **10**

b) State & prove Kelvin's circulation theorem. **10**

OR

c) Obtain Bernoulli's equation. **10**

d) Given u = – wy, v = wx, w = o. Show that the surface intersecting the stream lines orthogonally exist and are the planes through z-axis. Although the velocity potential does not exist. Discuss the nature of flow. **10**

UNIT – II

2. a) Find the equation of the stream lines due to uniform line sources of the strength M through the points A(– c, 0), B(c,0) and a uniform line sink of strength of 2m through the origin. **10**

b) Discuss the flow due to a uniform line doublets at O of strength μ per unit length its axis being along $\overline{OX}$. **10**

OR

c) State & prove Milne-Thomson circle theorem. **10**

d) State & prove theorem of Blasius. **10**

UNIT – III

3. a) Obtain Maxwell's thermodynamics relations. **10**

b) Discuss the internal energy of a gas. **10**

OR

c) Obtain two dimensional wave equation. **10**

d) Discuss on progressive & stationary wave. **10**

UNIT – IV

4. a) Derive the equation of motion of a gas. **10**

b) Describe isentropic gas flow. **10**

OR

c) Discuss the speed of a sound in a gas. **10**

d) Describe the investigation of maximum mass flow through a nozzle. **10**

5. a) Define stream line & path line. **5**

b) Define sources & sinks. **5**

c) Write a short note on spherical waves. **5**

d) Write a short note on Shock waves. **5**

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