M.Sc. - II (Mathematics) New CBCS Pattern Semester-III

PSCMTH14A - Fluid Dynamics - I (Optional)

P. Pages : 2 **GUG/W/23/13758**

Time : Three Hours * 7 3 4 4 * Max. Marks : 100

Notes : 1. Solve all **five** questions.
2. Each question carries equal marks.

UNIT – I

1. a) Obtain the equation of continuity in cartesian form. **10**

b) For an incompressible fluid $\bar{q} = [-wy, wx, 0]$ where w = constant. Discuss the nature of the flow. **10**

OR

c) Obtain Euler's equation of motion. **10**

d) Apply Bernoulli's equation in working of pitot tube. **10**

UNIT – II

2. a) State and prove Milne - Thomson circle theorem. **10**

b) Discuss the flow due to uniform line doublet at 0 of strength μ per unit length, its axis being along $\overline{ox}$ **10**

OR

c) Find the equation of the stream line due to uniform line source of the strength m through the point A(- C, 0), B(C, 0) and a uniform line sink of strength 2m through the origin. **10**

d) Discus the velocity components at of a uniform flow past a fixed infinite circular cylinder. **10**

UNIT – III

3. a) Obtain one dimensional wave equation. **10**

b) Obtain Maxwell's thermodynamics relation. **10**

OR

c) Find the profile $\phi(x,t)$ of an one dimensional wave propagation if $t = 0, \phi = f(x)$, $\frac{\partial \phi}{\partial t} = G(x)$ **10**

d) Discuss about progressive and stationary wave. **10**

UNIT – IV

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

b) Define speed of sound in gas and derive the equation of sound in gas. **10**

OR

c) Describe the investigation of maximum mass flows through a Nozzle. **10**

d) Discuss reservoir discharge through a channel of varying, section. **10**

5. a) Define the stream line and path line. **5**

b) Discuss the flow for which $w = z^2$. **5**

c) Define isothermal adiabatic and isentropic process. **5**

d) Explain the shock wave. **5**

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