

M.Sc.- II (Mathematics) New CBCS Pattern Semester-IV  
**PSCMTH19A - (Optional) : Fluid Dynamics-II**

P. Pages : 2

Time : Three Hours



**GUG/W/23/13770**

Max. Marks : 100

- Notes : 1. Solve all the five questions.  
2. Each question carry equal marks.

**UNIT – I**

1. a) Explain the rate of strain quadric & principal stresses. **10**  
b) Discuss the problem of steady motion between parallel planes. **10**

**OR**

- c) Explain the steady viscous flow in tubes of uniform cross-section. **10**  
d) Discuss the steady flow past a fixed sphere. **10**

**UNIT – II**

2. a) Explain the equations of motion of a conducting fluid. **10**  
b) Obtain the relation  $\frac{\partial(\omega, \psi)}{\partial(R, Z)} = 0$  for the Ferraro's law of isorotation. **10**

**OR**

- c) Discuss the Maxwell's electromagnetic field equations: Medium at rest. **10**  
d) Explain the simplification of the electromagnetic field equations. **10**

**UNIT – III**

3. a) Obtain the integral equation due to Kerman. **10**  
b) Discuss the Prandtl's boundary layer. **10**

**OR**

- c) Discuss in detail the Reynolds number & its applications. **10**  
d) Obtain the universal equation in dimensional analysis. **10**

**UNIT – IV**

4. a) Explain the features of the double longitudinal & lateral correlations in a homogeneous turbulence. **10**

b) Obtain the equations of motion for turbulence flow. **10**

**OR**

c) Discuss the change in double velocity correlations with time. **10**

d) Discuss the macro or integral scale of turbulence. **10**

**5.** a) Define: **5**

i) Components of stress tensor.

ii) Normal or direct stresses.

b) Explain shortly MHD. **5**

c) State & give the meanings of the dimensionless quantities. **5**

d) Define: **5**

i) The value of velocity.

ii) The average value of the velocity.

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