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AND TECHNOLOGY

PANJAB UNIVERSITY CHANDIGARH

Subject : Fluid Flow

Time : 1 HOUR

Max Marks : 25

1. Derive Navier-Stokes equation and Euler equation. State the assumptions taken and draw the relevant diagram. (10)
2. (i) What is eddy viscosity ? State the relation between eddy viscosity and eddy diffusivity of momentum. (3)  
(ii) What is kinematic and dynamic viscosity? Write a note on viscosity of liquids. (4)  
(ii) The apparent viscosity of a non newtonian liquid at a given shear rate is the value indicated by a viscometer operating on the liquid at shear rate. It is the viscosity that would be indicated by the viscometer if the liquid were Newtonian. Calculate the apparent viscosity of a 4 percent suspension of paper pulp in water at shear rates of  $10 \text{ s}^{-1}$  and  $1000 \text{ s}^{-1}$ . (5)
3. Explain the following terms: (3)
  - (i) Frictional losses from effect of fittings and valves .
  - (ii) Frictional losses due to sudden contraction of cross section.
  - (iii) Frictional losses due to sudden expansion of cross section.