53 (CE 303) FLMC

2017

FLUID MECHANICS

Paper : CE 303

Full Marks : 100

Time : Three hours

***The figures in the margin indicate
full marks for the questions.***

Answer ***any five*** questions.

1. The head loss in a horizontal pipe in
turbulent flow is related to the pressure drop
ΔP, and is a measure of the resistance to
flow in the pipe. It depends on the diameter
of the pipe D, the viscosity μ and density ρ,
the length of pipe l, the velocity of the flow
v and the surface roughness η. Find the
dimensionless relationship.   20

2. *(a)* For a town water supply, a main pipe line of diameter $0.4m$ is required. As pipes more than $0.35m$ diameter is not available, two parallel pipes of same diameter were used. If the total discharge in the parallel pipes is same as in the single main pipe, find the diameter of the parallel pipe. Assume same 'f' for all pipes. 15

(b) Derive the differential form of continuity equation. 5

3. *(a)* Derive the Darcy-Weisbach equation for pipe flow. 10

(b) Determine the kinematic viscosity of an oil having density $981 kg/m^3$. The shear stress at a point is $0.2452N/m^2$ and velocity gradient at that point is 0.2 per second. 10

4. Write short notes on : $4\times5=20$

(a) Types of orifice

(b) Types of mouthpiece

(c) Siphon

(d) Pipes in parallel.

5. (a) Derive Bernoulli's equation.   10

   (b) Derive discharge equation for venturimeter and orificemeter.   10

6. The water is flowing through a pipe of length $100\,m$ having diameters $600\,mm$ at the upper end and $300\,mm$ at the lower end if the pressure at the higher level is $19 \cdot 62\,N/cm^2$, find the pressure at the lower end discharge is $50\,l/s$. The pipe has a slope of 1 in 30.   20

———————