Minor I

Marks: 20

Time: One Hour

Solve the following. Assume the missing data suitably.

Q.1 Draw different flow regimes and basic system in the sediment transport through pipeline. [3]

Q.2 Derive the correlation for concentration profile in the flow of multisized particles through pipeline with all the intermediate steps. [6]

Q.3 Find out the concentration of solids at the pipe centre using the following data:
Pipe diameter = 20 cm; Flow velocity = 2.0 m/s; Solids specific gravity = 2.65 (sand). Carrier fluid is water.

Solids size consist:

Mean diameter (cm)	Percent by weight	Fall velocity (m/s)
0.0075	40	0.0055
0.0050	20	0.0015
0.0025	40	0.0005

Slurry concentration = 10 % by volume;
Static settled concentration = 50% by volume
Pipe is smooth.

[7]

Q.4 Explain the experimental method with equations involved in the determination of static settled concentration. [2]

Q.5 Plot shear stress vs. shear rate curves for different type of fluids: [2]

a) $0.369Ru \cdot \frac{v}{R}\left(1 \quad \frac{v}{R}\right)$ for $0 \leq v/D \leq 0.337$

a) $0.0775Ru \cdot$ for $0.337 \leq v/D \leq 0.663$

$\beta = 1.0 + 0.125\ e^{4.22C_{vf}/C_{vss}}$; $\varepsilon_s = \beta\varepsilon_f$

$f = 0.316\,\mathrm{Re}^{-0.25}$

$Z = 4.5$

$\frac{\mu_m}{} = 1 + 2.5C \quad +10.05C^2 \quad + 0.00273\ e^{(16.6C_v)}$