Answer all the following Questions (assume any missing data)
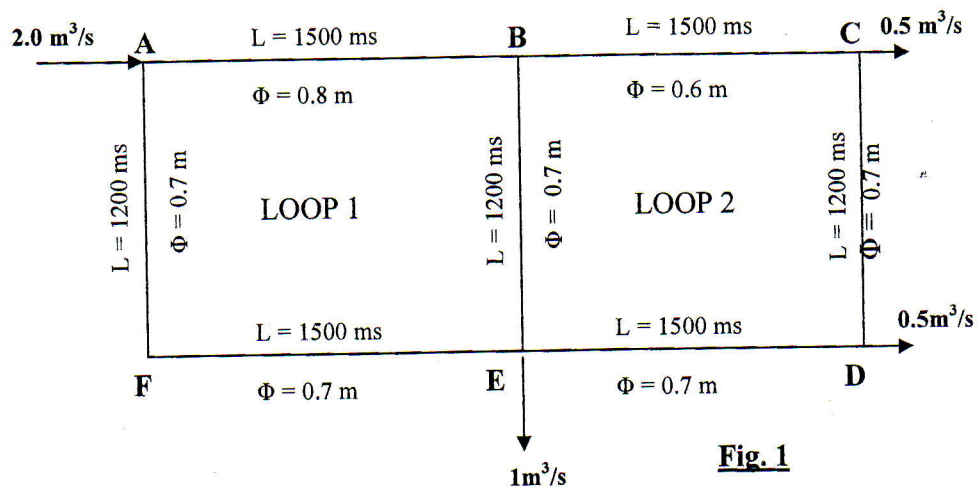
Marks

Question (1)

[20]

Discuss the different types, advantages and disadvantages of pipes used in gravity sewerage systems provide applied tests for vitrified clay type .... *(20)*

Question (2)

[30]

Given the network shown in Fig. 1, the inflow at A, and outflows at C, D and E. Using Hardy Cross method, find the flows in the individual pipes comprising the network (only two trials are required)...*(30)*

Fig. 1

Question (3)

[30]

(a) Discuss the properties of good disinfectant and the factors affecting disinfection process efficiency .... *(15)*

(b) Differentiate Nitrification from denitrification ....*(15)*

Question (4)

a) Draw Oxygen Sag Curve showing all components and parameters. ……………..... *(10)*

b) Wastewater discharges to a river resulting initial BOD = 12.0 mg/L and DO = 7.0 mg/L.

   Calculate the critical time and location downstream for minimum DO? …............. *(10)*

Knowing that:

- Deoxygenation constant = 0.2 /day

- Average flow speed = 3.0 m/min.

- Average river depth = 3.0 m

- Saturated DO = 8.7 mg/L

- Neglect temperature correction.

Use the following formulas:

$$K_2 = \frac{3.9\, V^{1/2}}{H^{3/2}}$$

$$t_c = \frac{1}{K2-K1} \ln \left\{ \frac{K2}{K1} \left(1 - \frac{Do\,(K2-K1)}{K1\,Lo} \right) \right\}$$

End of Exam - Good luck

Question Number	Q1	Q2-a	Q2-b	Q3-a	Q4-a	Q2	Q3-b	Q4-a			Q2	Q3-b	Q4-b		
Skills	a1-1	a1-2	a1-1	a1-2	a1-2	b2-1	b2-1	b2-1			c1-1	c1-1	c1-1		
	Knowledge &Understanding Skills					Intellectual Skills					Professional Skills				

This exam measures the following ILOs