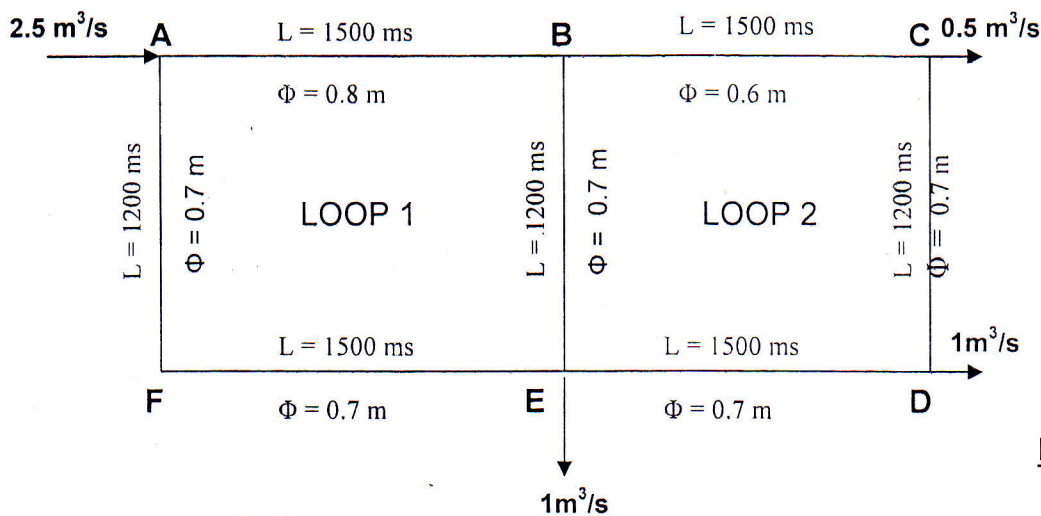




Answer all the following questions: (Hazen-Williams chart is allowed and any missing data can be assumed)

**Question 1 (30 marks)**

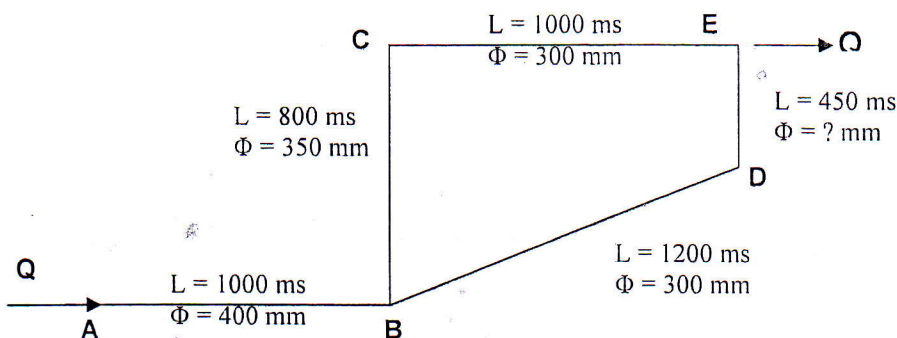
- a) What is the procedure in the design of water distribution system?.....[5]  
 b) Given the network shown in Fig. 1, the inflow at A, and outflows at C, D and E. Using Hardy Cross method, find the flows in the individual pipes comprising the network (only one trial is required).....[25]



**Fig. 1**

**Question 2 (25 marks)**

- a) What is the meaning of equivalent pipe?.....[5]  
 b) In the shown network Fig. 2 of a distribution system ABCDE, it is required to determine the diameter of the new pipeline DE established between points D and E, giving the following data :  
 Discharge  $Q = 210$  lit/sec.  
 Pressure at **A** = 50 meter head.  
 Pressure at **E** = 20 meter head.....[20]



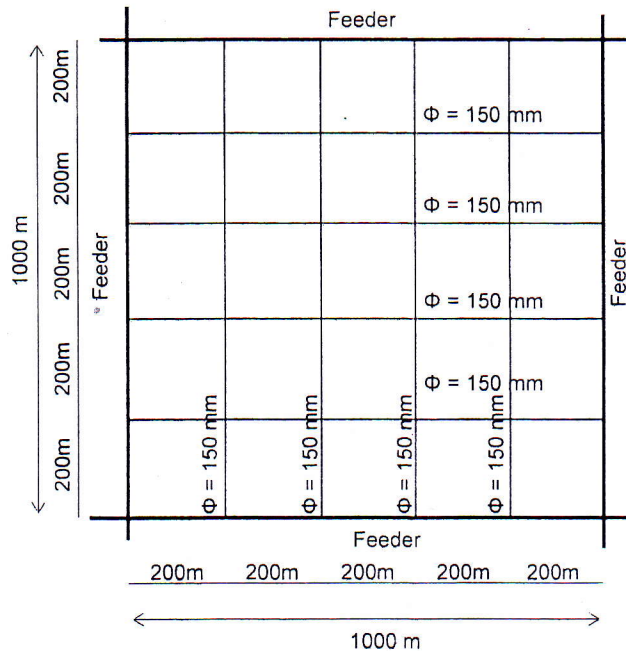
**Fig. 2**

**Question 3 (25 marks)**

- a) Compare (using sketches as possible) between different types of surface water intakes.....[10]
- b) An artesian well is pumped at the rate of  $1.6 \text{ m}^3/\text{min}$ . At observation wells 150m and 300m away, the drawdowns noted are 0.75m and 0.60m, respectively. The average thickness of the aquifer at the observation wells is 6.0m. Compute the coefficient of permeability of the aquifer.....[15]

**Question 4 (20 marks)**

Investigate the minor pipes of the distribution system shown in Fig. 3. The required fire flow 400 lit/sec. Feeders are 1000 ms apart and the normal pressure in the feeders is  $2.8 \text{ kg/cm}^2$ .



**Fig. 3**

**End of Exam - Good luck**

This exam measures the following ILOs

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