



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]

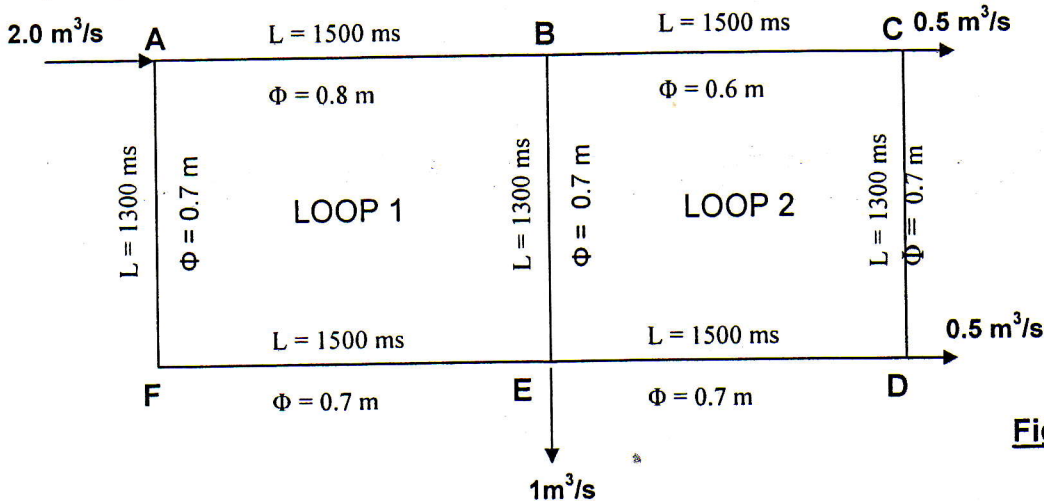


Fig. 1

Question 2 (25 marks)

- a) Define equivalent pipe?.....[5]
 b) Determine the diameter of pipeline BC in the shown network Fig. 2 of a distribution system, given the following data:
 Discharge $Q = 200$ lit/sec.
 Pressure at A = 50 meters head.
 Pressure at E = 30 meters head.....[20]

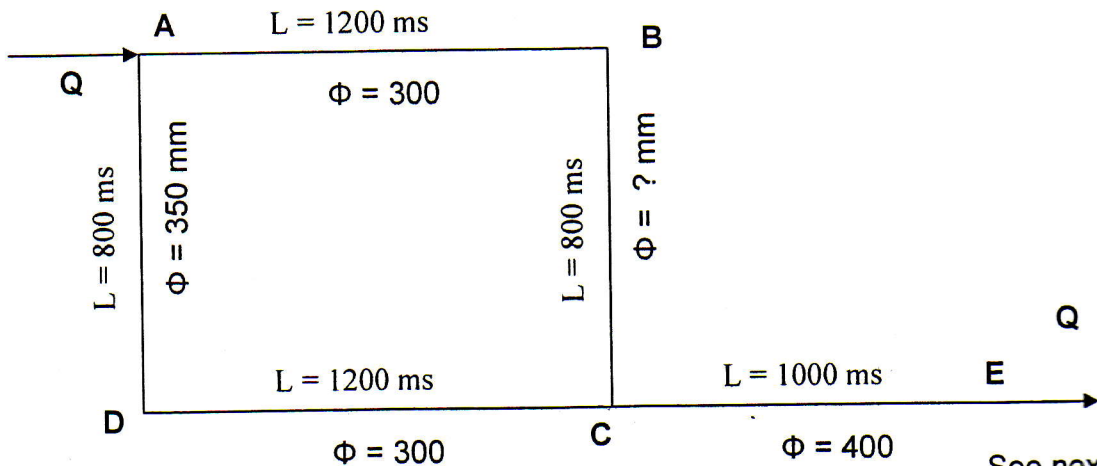


Fig. 2

See next page

Question 3 (25 marks)

Investigate the network shown in Fig. 3 at sections A-A and B-B
 Given the following data: Population of the city = 120,000 capita
 Fire demand = 350 lit/sec.
 Population up to section A-A = 30 % of the total population.
 Population up to section B-B = 70 % of the total population.
 Annual average rate of water consumption 100 lit/capita/day.

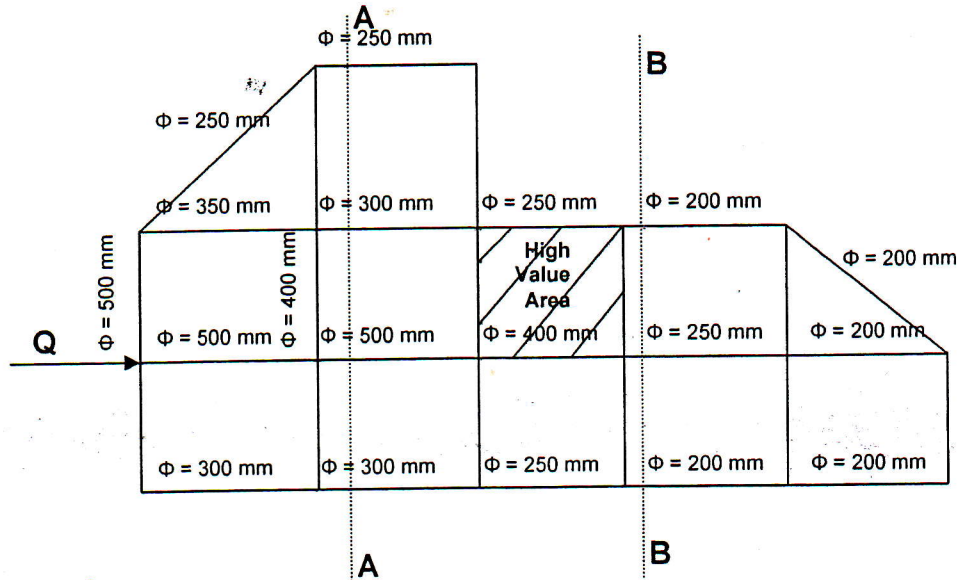


Fig. 3

Question 4 (20 marks)

Investigate the minor pipes of the distribution system shown in Fig. 4.
 The required fire flow 300 lit/sec. Feeders are 1000 ms apart and the normal pressure in the feeders is 2.8 kg/cm^2 .

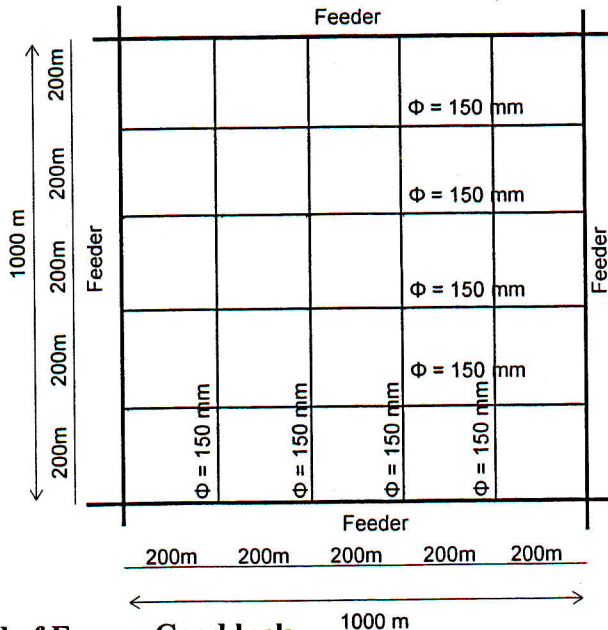
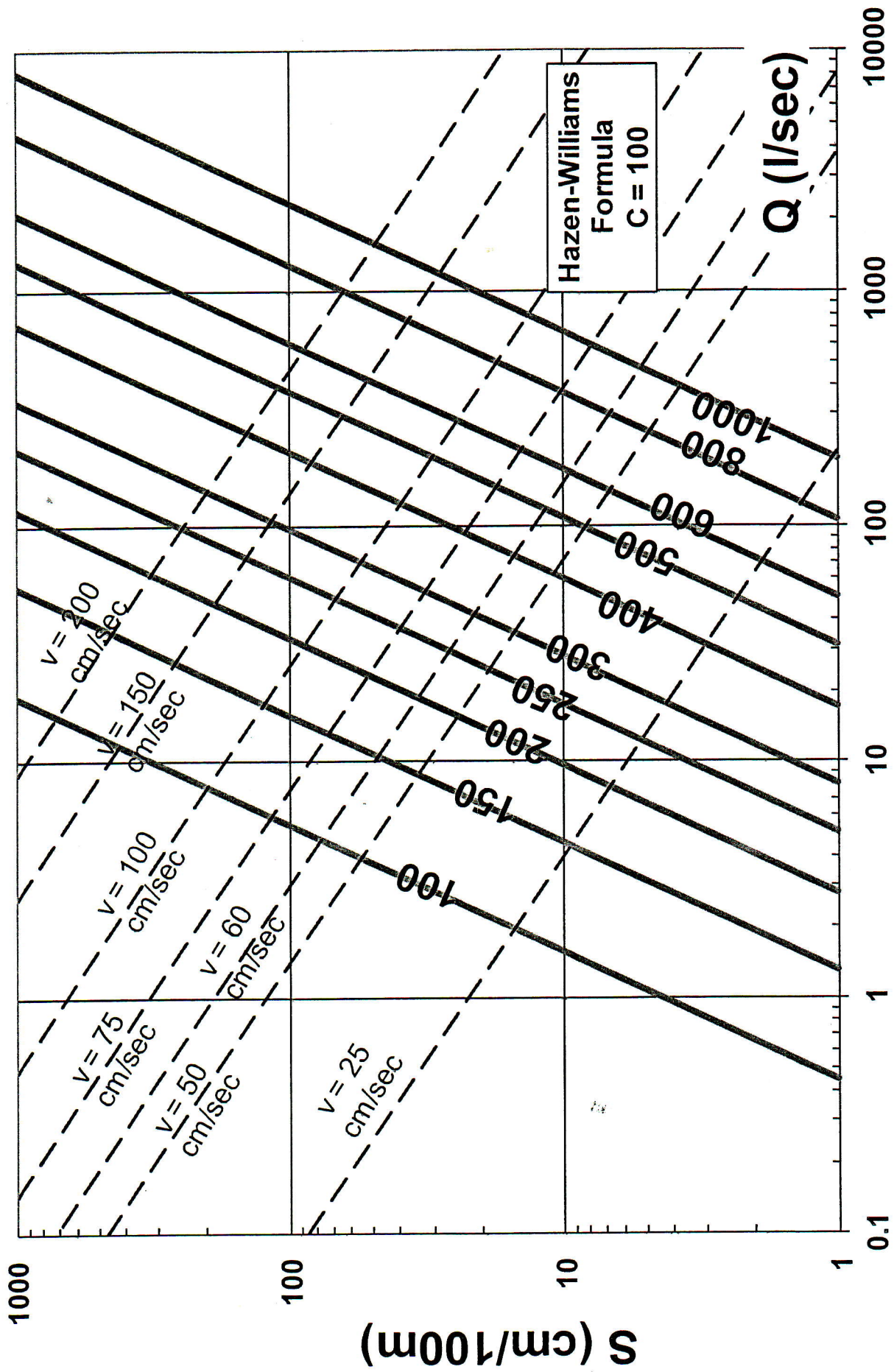


Fig. 4

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			



S (cm/100m)

Q (l/sec)

Hazen-Williams
Formula
C = 100

1000

100

10

1

0.1

1

10

100

1000

10000

v = 200
cm/sec

v = 150
cm/sec

v = 100
cm/sec

v = 75
cm/sec

v = 50
cm/sec

v = 60
cm/sec

v = 25
cm/sec

100

150

200

250

300

400

500

600

800

1000