B.E. (Civil Engineering) Eighth Semester (C.B.S.)

Elective - II : Water Transmission & Distribution Systems

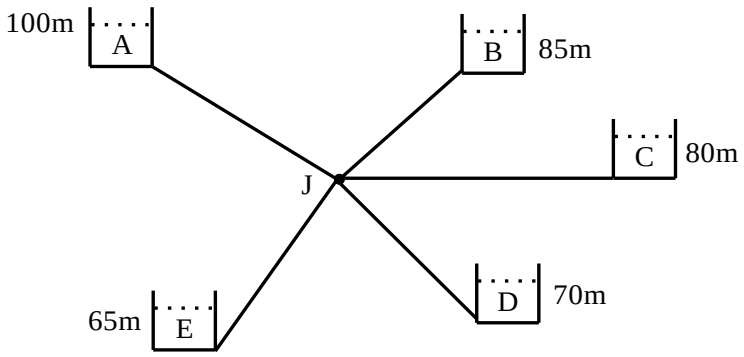
P. Pages : 4 **NIR/KW/18/3618**

Time : Three Hours * 1 3 7 8 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Use of non programmable calculator is permitted.

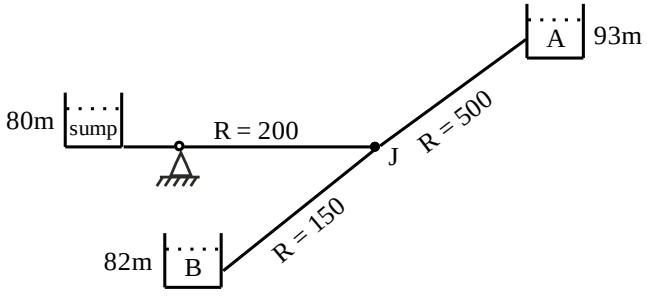
1. Determine the discharges through various pipes and their directions acted to the reservoir as shown in the figure. The pipes details are : **14**

Pipe	Length m	Diameter mm	f
AJ	400	200	0.025
BJ	300	150	0.025
CJ	320	150	0.025
DJ	280	100	0.025
EJ	150	120	0.025

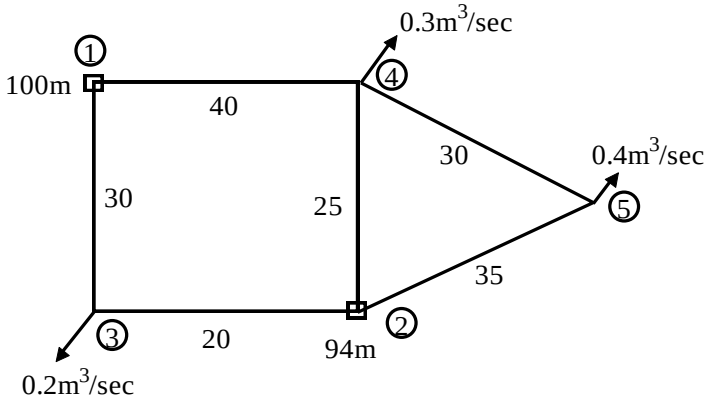


OR

2. A pump P lifts water from a sump having water level of 80m and others two water tanks with RL of 93m & 82m resp. All the pipes are connected at point J. The details regarding theirs parameters as shown in figures. The pump equation is $\left[Hp = 17.2 - 49.2 Q^{1.852} \right]$. Determine the discharge at each pipes also find the Head at junction (J). **14**

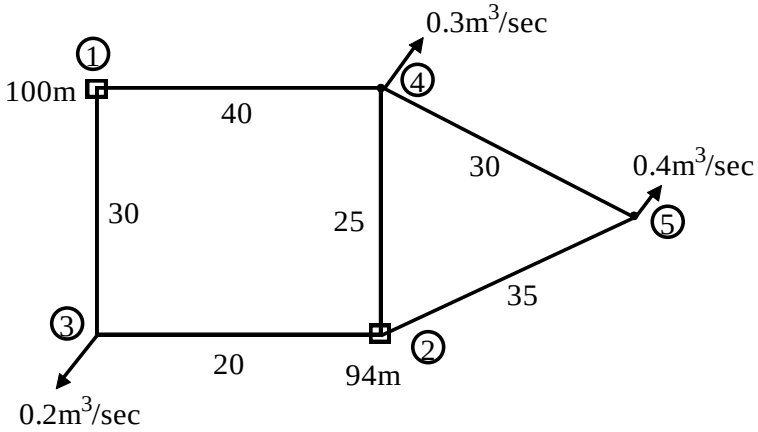


3. For the given network carryout one complete iteration and calculate the corrected Head using Newton Raphson's ΔH Method. **13**

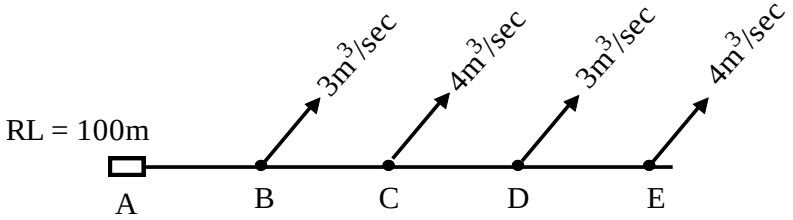


OR

4. From the given network carryout one complete iteration using linear theory ΔQ Equation. **13**



5. A serial distribution network consist of source node A & four demand nodes B, C, D, E. The available HGL values at A is 100 m, The Level at node B, C, D, & E are 90m, 88m, 85m & 82m resp. The resistance constant for pipe AB, BC, CD & DE are 0.05, 0.12, 0.2, 0.3 respectively in Hazen Williams pipe head loss relationship. Carry out the node flow Analysis of the network, shown in Figure. **13**



OR

6. Write notes on following : **13**

a) Differentiate between NFA and NHA.

b) Differentiate between Hardy Cross Method of Balancing head & Balancing Flow.

c) Node Flow compatibility.

7. Following data corresponds to a Distribution Reservoir : **13**

Time (hrs)	Demand (m^3 / sec)
0 – 2	6.2
2 – 4	7.8
4 – 6	15.8
6 – 8	17.2
8 – 10	19.8
10 – 12	20.2
12 – 14	26.6
14 – 16	16.2
16 – 18	18.4
18 – 20	24.1
20 – 22	16.3
22 – 24	10.2

Pumping is to be done at a uniform rate from 6 hr to 12 hrs and 15 hrs to 21 hrs.
Determine the : (i) Uniform rate of pumping (ii) Minimum Capacity of reservoir.

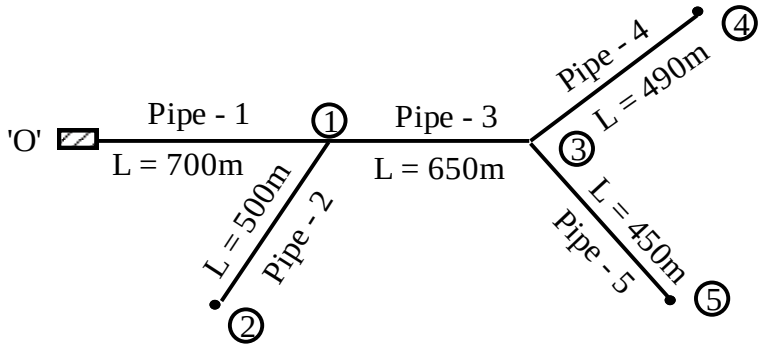
OR

8. The pumping is to be serve a population of 90,000 @ 200 lpcd. If the pumping period is 8 hrs/day and length of Rising main is 2 KM. The static lift is 20m. The efficiency of pump is 90%, efficiency of motor is 80%, Power factor is 90%, Design period is 3.0 years, Rate of interest is 8%. Cost of electricity is Rs. 1.25 per kWh. The data regarding the pipe diameter their cost and CHW is given in the table, Select Optimal Diameter of Pumping Main. **13**

Pipe Diameter in mm	Unit cost (Rs.)	CHW
300	380	105
400	750	108
500	880	110
600	1200	113
700	1580	115

9. In the Network shown in figure "O" is the source node with available HGL value 126.0m and node 1 to 5 are demand nodes with following details. **14**

Demand Node	Minimum HGL	Demand m^3 / min
1	118	5.1
2	113	3.8
3	115	3.9
4	114	2.5
5	113	2.5



Carry out one complete iteration by using cost head loss ratio criterion for the network shown in figure. Head loss is given by Hazen Williams formula. Use CHW = 110 for all pipes. The cost function is given by $C = 0.132 D^{1.4} L$ in which C is cost of the pipes in INR, D is diameter of pipe in mm and L is length of pipe in meter.

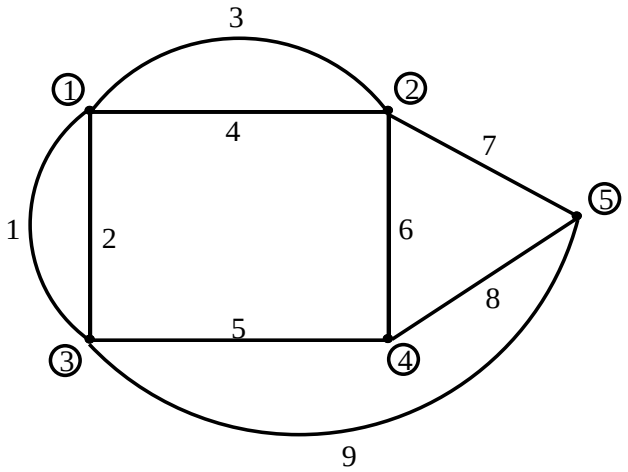
OR

10. Design the Network described in Question No. 9 using relevant data and same cost function. **14**

i) Frame LP model.

ii) Obtain basic feasible solution.

11. Find the total Number of possible trees of the Network as shown in figure. Sketch all the trees in which links 1, 4 & 6 are absent. **13**



OR

12. a) Differentiating Path concept & minimum spanning of tree method. Explain with the help of neat sketch. **5**

b) Explain cost head loss ratio criterion method of network optimization. **8**

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