



FINAL EXAM-CVG 3120 (HYDROLOGY)

Professor: Seidou Ousmane

Wednesday, December 19th, 14h-17h

Duration: 3h

Exam is open book

PROBLEM 1 (10 pts)

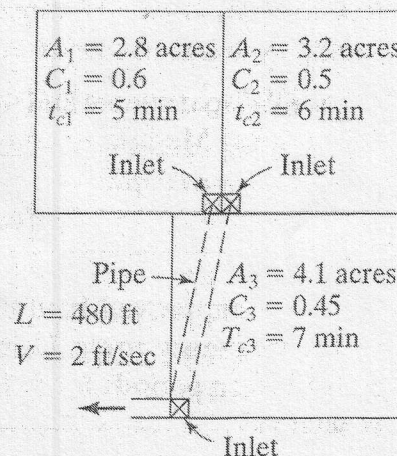
The water-surface elevations of two water bodies located 375 ft apart differ by 0.5 ft. For a steady-state discharge of 40 gal/day/ft, compute the hydraulic conductivity of the unconfined aquifer. The elevation of the lower water surface is 4.5 ft. Compute the water table elevation at 100 ft, 200 ft and 300 ft from the first water body.

PROBLEM 2 (20 pts)

From the IDF curve shown on the next page, determine the missing values of intensity, depth, duration, or frequency for the following table:

Intensity (in./hr)	Depth (in.)	Duration (hr)	Frequency (yr)
2.0	4.00	—	—
—	4.80	24.0	—
—	—	6.0	75
—	0.58	0.083	—
0.3	—	12.0	—

For the following watershed schematic shown, find the peak discharge (using the Rational Method) into each inlet and the required discharge capacity for each pipe segment. Use a 50-yr return period and the above IDF curve



Land Use Description on Input Screen	Description and Curve Numbers from TR-55					
	Cover Description		Curve Number for Hydrologic Soil Group			
	Cover Type and Hydrologic Condition	% Impervious Areas	A	B	C	D
Agricultural	Row Crops - Straight Rows + Crop Residue Cover - Good Condition ⁽¹⁾		64	75	82	85
Commercial	Urban Districts: Commercial and Business	85	89	92	94	95
Forest	Woods ⁽²⁾ - Good Condition		30	55	70	77
Grass/Pasture	Pasture, Grassland, or Range ⁽³⁾ - Good Condition		39	61	74	80
High Density Residential	Residential districts by average lot size: 1/8 acre or less	65	77	85	90	92
Industrial	Urban district: Industrial	72	81	88	91	93
Low Density Residential	Residential districts by average lot size: 1/2 acre lot	25	54	70	80	85
Open Spaces	Open Space (lawns, parks, golf courses, cemeteries, etc.) ⁽⁴⁾ Fair Condition (grass cover 50% to 70%)		49	69	79	84
Parking and Paved Spaces	Impervious areas: Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	100	98	98	98	98
Residential 1/8 acre	Residential districts by average lot size: 1/8 acre or less	65	77	85	90	92
Residential 1/4 acre	Residential districts by average lot size: 1/4 acre	38	61	75	83	87
Residential 1/3 acre	Residential districts by average lot size: 1/3 acre	30	57	72	81	86
Residential 1/2 acre	Residential districts by average lot size: 1/2 acre	25	54	70	80	85
Residential 1 acre	Residential districts by average lot size: 1 acre	20	51	68	79	84
Residential 2 acres	Residential districts by average lot size: 2 acre	12	46	65	77	82
Water/ Wetlands		0	0	0	0	0

PROBLEM 6 (20 pts)

An underground storage tank with rectangular sections (length = 100 ft, width = 70 ft., height = 50 ft) is used for temporary control of storm runoff. Determine the stage storage-discharge relationship assuming outflow from the tank is controlled by an orifice at the base of the tank. The rectangular orifice has a length of 3 ft and a height of 0.5 ft. The loss coefficient is 0.6. Write down the equation of the storage indicator as a function of the discharge through the orifice.

Start routing the following hydrograph through the reservoir (**Do not route the entire hydrograph: the three first discharge values of the routed hydrograph are sufficient**).

TIME (h)	DISCHARGE (ft ³ /S)	TIME(h)	DISCHARGE (ft ³ /s)
6:00 A.M.	30	1 :00 P.M.	430
7:00	30	2:00	400
8:00	60	3:00	300
9:00	120	4:00	240
10:00	240	5:00	180
11 :00	420	6:00	30
12 :00	450		

BONUS PROBLEM (10 pts)

Compute the direct-runoff hydrograph for the following rainfall excess and UH.

