

URBAN INFRASTRUCTURE HYDRAULIC SYSTEMS

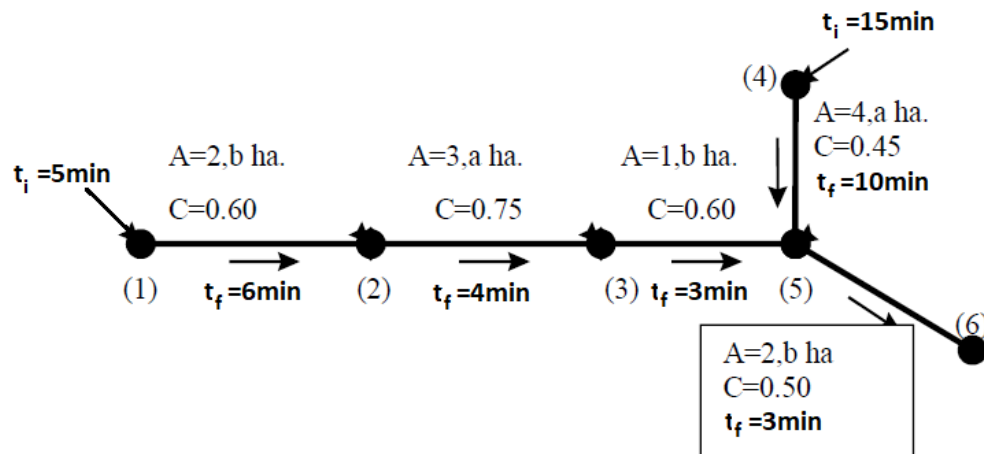
Assignment III

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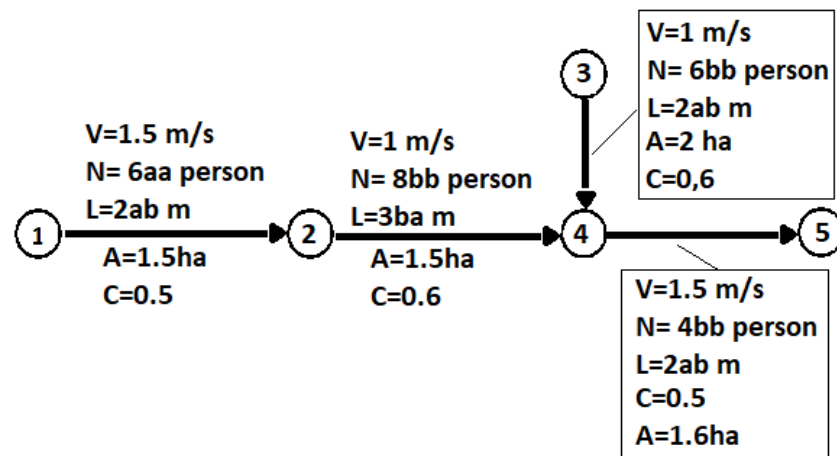
QUESTION 1: Answer the following questions. Draw sketches where needed.

- Explain the functions of manholes in sewage systems.
- What types of sewage systems are used? Explain.
- Explain the runoff coefficient.
- Explain the inlet time, flow time and concentration time in storm water systems.
- Determine the hydrographs when the flow time is 5 minutes and rainfall durations are 3, 5, and 7 minutes respectively. Discuss.

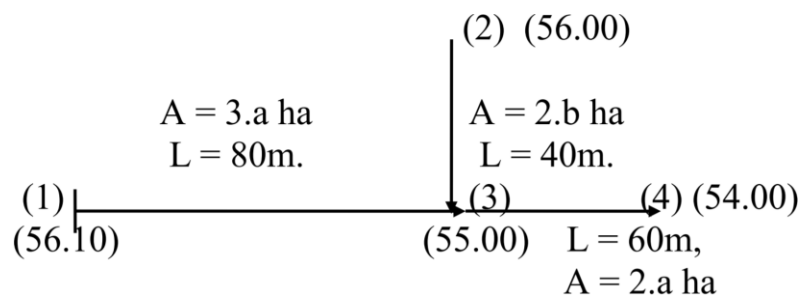
QUESTION 2: The layout of the storm water collection system is given below with areas that served by each channel, run-off coefficients, inlet times for starting manholes and flow times for channels. Determine the discharges of all channels for the design rainfall of $n=2$ and $T=15\text{min}$. (Rainfall yield $r=1\text{ab l/s.ha}$ is for the rainfall of $n=1$ and $T=15\text{ min.}$)



QUESTION 3: For the system given below, determine the waste water and the storm water discharges of all channels for the design storm of $n=1$, $T=10$ min. (Rainfall yield is $r=1ab$ l/s.ha for the rainfall of $n=1$ and $T=15$ min.)



QUESTION 4: Determine the waste water and the storm water flowrates of all channels and design the channels. ($h_{max}=5.0m$, $h_{min}=2.70$ m, $(h/D)_{max}=90\%$, $J_{max}= 1/15$, $J_{min}= 1/\phi$ (ϕ : D_{min} (mm)), $maxq_{day}= 2ba$ l/day/capita, Population Density $k=3ba$ person/ha, $V_{min}= 0.5$ m/s, $V_{max}= 3$ m/s). Standard Pipe Diameters are: 20 cm, 30 cm, 30 cm, 40 cm, 50 cm, 60 cm, 70 cm, 80 cm, 90 cm, 100 cm.



QUESTION 5: Determine the storm water flowrates of all channels and design the channels given in the figure below. ($h_{max}=4.0m$, $h_{min}=1.20$ m, $(h/D)_{max}=90\%$, $J_{max}= 1/15$, $J_{min}= 1/\phi$ (ϕ : D_{min} (mm)), $F=5$). Draw the longitudinal section of channel 1-2-4-5. Standard Pipe Diameters are: 30 cm, 30 cm, 40 cm, 50 cm, 60 cm, 70 cm, 80 cm, 90 cm, 100 cm.

