

Question 4.3:

The intensity of a storm having a **duration** of **45 minutes**: $i = 3 \times t^{-0.5}$ (i, mm/hr; t, hr)

- a) Obtain the equation for the mass curve of rainfall and calculate the total precipitation depth,
- b) Considering the parameters of Horton's equation as $f_c = 2 \text{ mm/hr}$, $f_0 = 4 \text{ mm/hr}$, and $k = 0.5$, calculate the amount of total infiltrated water (F) during the storm,
- c) Calculate the surface runoff arising from the storm and the infiltration index (W).

Question 4.4:

The rainfall having a **duration** of **90 minutes** and varying as $P = 4.167 \times t^{0.6}$ (P cm, t hour) infiltrated into the soil having a k constant of 1.58. The **infiltration capacity** is **6.117 cm/hr** 12 minutes later and **2.966 cm/hr** 48 minutes later.

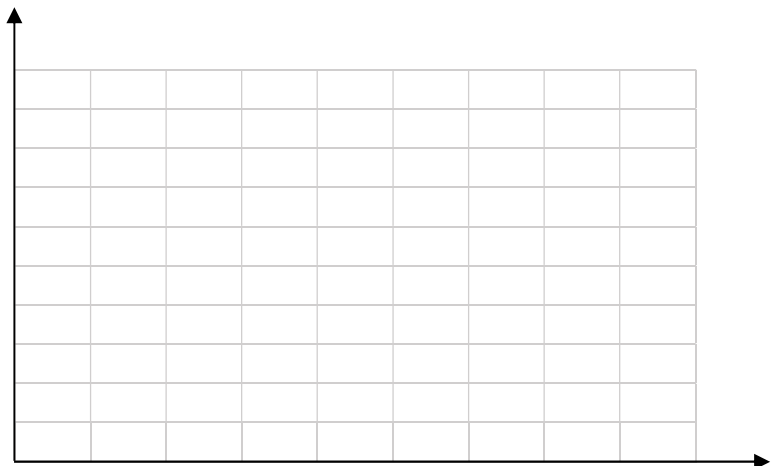
- a) Obtain the formulas giving the variation of the precipitation intensity versus time and the variation of the infiltration capacity versus time,
- b) Calculate the precipitation intensity (**i**) and infiltration capacity (**f**) at intervals of 15 minutes during the storm,
- c) Calculate the depth of total precipitation (**P**), amount of total infiltrated water (**F**), the depth of surface runoff, and runoff coefficient.

Question 4.5:

It was rained on soil having a **k** constant of 1.8, an **initial infiltration rate** of **20 mm/hr**, and a **final infiltration rate** of **6 mm/hr**. The precipitation depths versus time are tabulated below:

t, min	0	10	20	40	60	90
P, mm	0	5	10	16	21	26

- a) Calculating the variation of the precipitation intensity (**i**) versus time (**t**) and the variation of infiltration rate (**f**) versus time (**t**), draw the hietograph and the standard infiltration rate curve on the same figure, and show the surface runoff,
- b) Calculate the depth of surface runoff, amount of total infiltrated water (**F**), runoff coefficient, and the Φ -index.

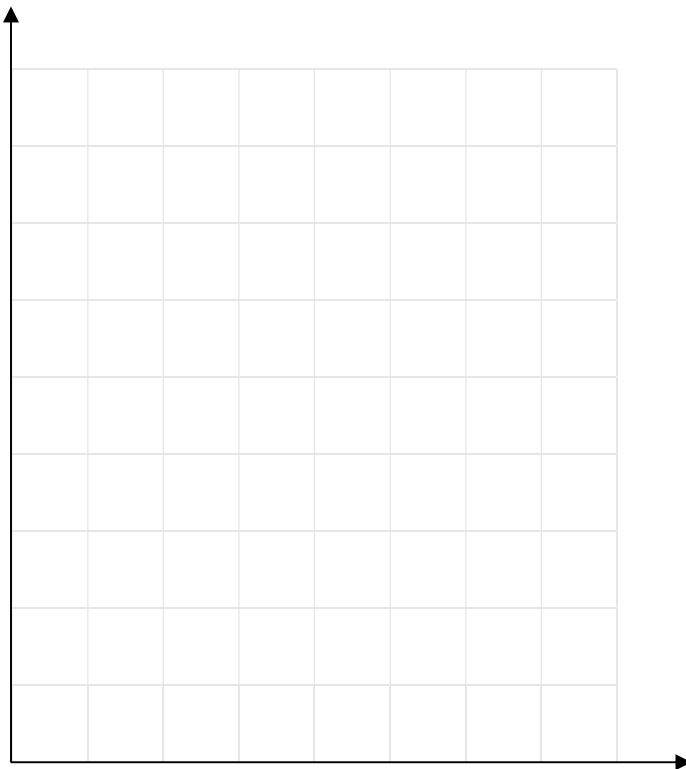


Question 4.6:

During a storm, the recorded total rainfall depths are tabulated below:

Time (min)	0	20	40	60	80	100	120	140	160
ΣP (mm)	0	8	18	36	53	61	65	67	67

Draw the hyetograph and calculate the **Φ -index** for a surface runoff depth of **10** mm.



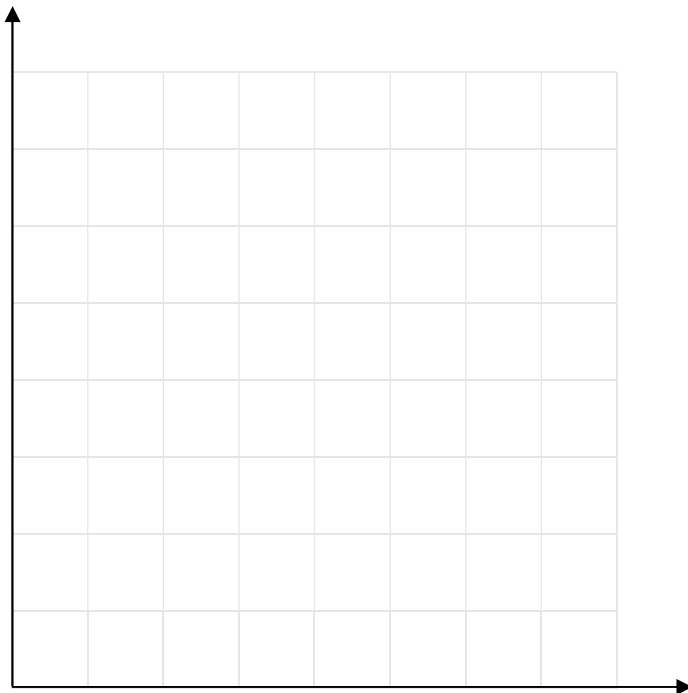
Question 4.7:

It was rained on soil having a **k** constant of **2.4**, an initial infiltration rate of **20 mm/hr**, and a final infiltration rate of **8 mm/hr**. The cumulative precipitation depths of a storm are tabulated below:

a) Calculate the variation of the infiltration rate and the precipitation intensity

Time (min)	0	10	20	30	40	50	60
ΣP (mm)	0	4	6	9.5	12.5	15	16

b) Draw the standard infiltration curve and the hyetograph and show the infiltration and surface runoff,



c) Calculate the infiltrated amount of water, depth of surface runoff, and runoff coefficient between **20 min** and **50 min**,

d) Calculate the **Φ -index** for a surface runoff depth of **5 mm**.