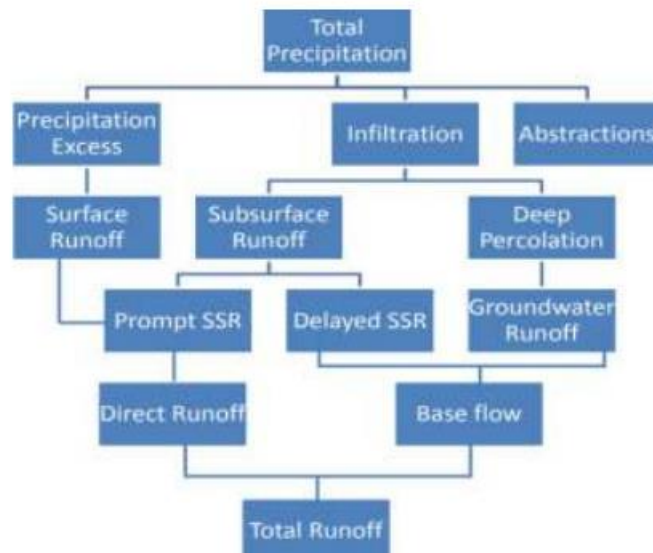


## I. RUNOFF

Runoff can be defined as the portion of the precipitation that makes its way towards rivers or oceans etc, as surface or subsurface flow. Portion which is not absorbed by the deep strata. Runoff occurs only when the rate of precipitation exceeds the rate at which water may infiltrate into the soil.



### 1.1 Types of Runoff

- Surface runoff – Portion of rainfall (after all losses such as interception, infiltration, depression storage etc. are met) that enters streams immediately after occurring rainfall – After laps of few time, overland flow joins streams – Sometime termed prompt runoff (as very quickly enters streams)
- Subsurface runoff – Amount of rainfall first enter into soil and then flows laterally towards stream without joining water table – Also take little time to reach stream
- Base flow – Delayed flow – Water that meets the groundwater table and join the stream or ocean– Very slow movement and take months or years to reach streams

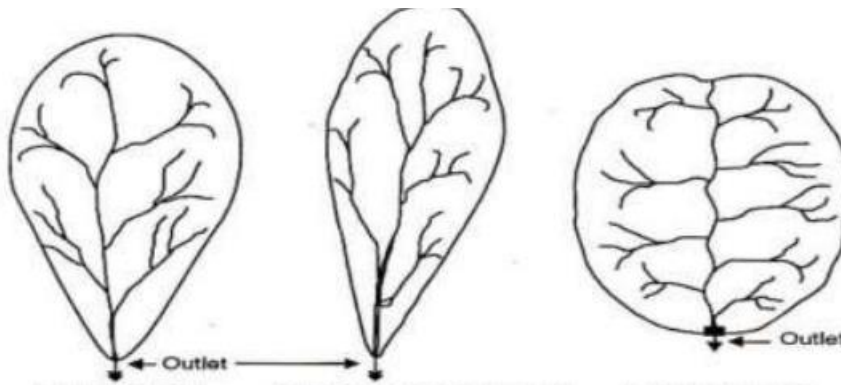
### 1.2 Factors affecting runoff

- Climatic factors – Type of precipitation
- Rain and snow fall – Rainfall intensity
- High intensity rainfall causes more rainfall – Duration of rainfall

- When duration increases, infiltration capacity decreases resulting more runoff – Rainfall distribution
- Distribution of rainfall in a catchment may vary and runoff also vary
- More rainfalls closer to the outlet, peak flow occurs quickly
- Direction of prevailing wind – If the wind direction is towards the flow direction, peak flow will occur quickly
- Other climatic factors – Temperature, wind velocity, relative humidity, annual rainfall etc. affect initial loss of precipitation and thereby affecting runoff
- Physiographic factors – Physiographic characteristics of watershed and channel both – Size of watershed
- Larger the watershed, longer time needed to deliver runoff to the outlet
- Small watersheds dominated by overland flow and larger watersheds by runoff

### **1.3 Shape of watershed**

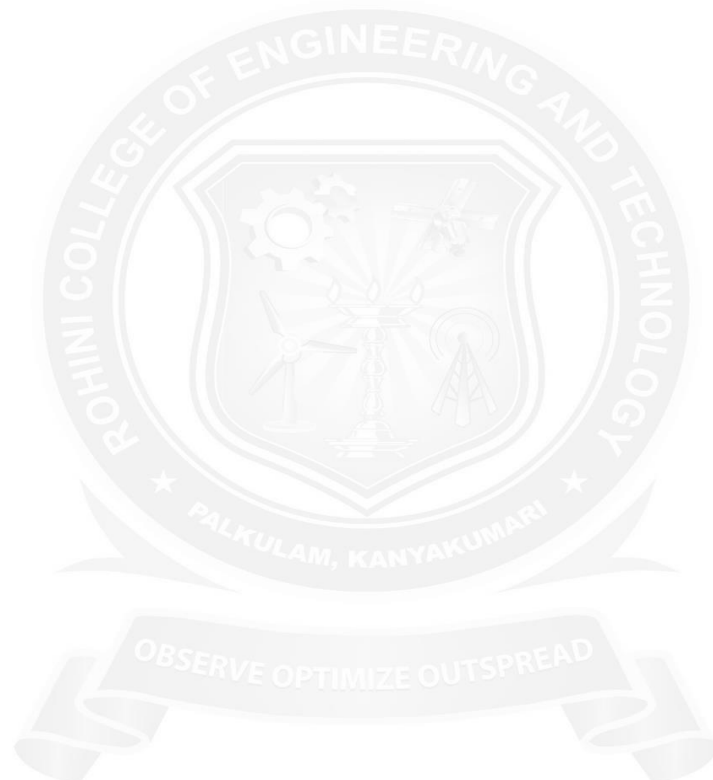
- Fan shaped, fan shaped (elongated) and broad shaped



- Fan shaped – runoff from the nearest tributaries drained out before the floods of farthest tributaries. Peak runoff is less
- Broad shaped – all tributaries contribute runoff almost at the same time so that peak flow is more – Orientation of watershed
- Windward side of mountains get more rainfall than leeward side

#### **1.4 Land use**

- Forest – thick layer of organic matter and undercover– huge amounts absorbed to soil – less runoff and high resistance to flow
- barren lands – high runoff – Soil moisture
- Runoff generated depend on soil moisture – more moisture means less infiltration and more runoff
- Dry soil – more water absorbed to soil and less runoff – Soil type
- Light soil (sandy) – large pores and more infiltration
- Heavy textured soils – less infiltration and more runoff – Topographic characteristics
- Higher the slope, faster the runoff
- Channel characters such as length, shape, slope, roughness, storage, density of channel influence runoff - Drainage density



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