ITU
CIVIL ENGINEERING FACULTY HYDRAULICS DIVISION
HYDROLOGY

Examples –1 Introduction to Hydrology and Analysis of Precipitation

1. Annual precipitation in a particular year was measured to be 70 cm over a lake with 200 km^2 surface area. The mean annual inflow and outflow discharges by the rivers to this lake is given as 1.20 m^3/s and 1.27 m^3/s, respectively. A 9 cm rise was observed in water level for that year. The leakage from the lake bottom is negligibly small. Considering given data calculate the annual evaporation depth of the lake for that particular year. (ans=0.6m)

2. The reservoir capacity of a small dam constructed to supply water to a nearby town is $14x10^6$ m^3. At the beginning of February there is $8x10^6$ m^3 water in the reservoir. The precipitation and evaporation depths for this month are given as 120 mm and 35 mm, respectively. The inflow during February is $6.7x10^6$ m^3, and water demand of the town is $0.18x10^6$ m^3. If the surface area of the reservoir is 1.1 km^2, calculate the water volume that is to be spilled from the dam for February after the water demand of the town is supplied. (ans=$0.61x10^6m^3$)

3. The water volume in Demirköprü Dam reservoir at the beginning of July 1972 is $404x10^6$ m^3. At the end of the same month the remaining water volume in the reservoir is $359x10^6$ m^3. During this month the water volume spent for energy production is 58 $x10^6$ m^3 and surface evaporation is $9x10^6$ m^3. Calculate the mean discharge carried by Gediz River to the dam for this month. (ans=$8.21m^3/s$)

4. The average inflow discharge to a lake with 40 km^2 surface area is 0,56 m^3/s during June while outflow discharge is measured 0,48 m^3/s. Monthly precipitation height is 445 mm and evaporation is 105 mm. During this month leakage from the bottom of the lake is 25 mm. Calculate water level and volume change during the June. (ans=0.32m)

5. Radiation reaching the surface of earth is 45 when the radiation from the sun at the outer edge of the atmosphere is taken as 100. Long wave radiation from the earth to the atmosphere is 104, long wave from the earth directly to the space is 15. Atmosphere reflects 98 of the long wave radiation back to earth. The daily average energy coming from the sun is 680 cal/cm^2 at the outer edge of the atmosphere. Find the energy used in evaporation and annual depth of evaporation. (ans=101cm)

6. P1 precipitation gage has recorded the reading below during a strom. Accordingly
   a) Draw the curve which shows the variation of total precipitation with respect to time.
   b) Draw the curve showing the variation of precipitation intensity time (hyetograph).

Time	02:16	02:20	02:22	02:25	02:27	02:30	02:32
Total Precipitation (mm)	0,5	3,0	8.0	13.0	18.0	23.0	25.5