DEPARTMENT OF CIVIL ENGING
ASSIGNMENT

Discipline: MS Civil Engineering Submitted By: Muhammad Yasir
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Q.1 :
Ans:

Hydrological Cycle:

Water cycle, also called **hydrologic cycle**, cycle that involves the continuous circulation of water in the Earth-atmosphere system. Of the many processes involved in the water cycle, the most important are evaporation, transpiration, condensation, precipitation, and runoff. Although the total amount of water within the cycle remains essentially constant, its distribution among the various processes is continually changing.

The discussion that hydrological has been disturbed is reality and it is due to two main reason which are as under…

i. Climate change
ii. Human impacts

(i**). Climate change :** Climate change increases our risk of both heavy rains and extreme droughts.
Science has shown that climate change touches every corner of our planet's ecosystem, and the water cycle is no exception. Because the processes involved are highly dependent on temperature, changes in one have consequences on the other.

- Higher temperature mean there is more evaporation from land and sea into the atmosphere.
- As air gets warmer it can hold more water vapor this can lead to more intense rainstorms.
- Intense rain storm increase the risk of intense flooding. Much of the water run off to the river and streams, doing little to dampen soil.
- This combine with increase temperatures, increase the risk of drought.

(ii) Human impacts:

Water is one of the most precious resources.

Here are a few of the biggest effects on the water cycle:

Urbanization

- One of the most concerning human activities that affects the entire water cycle is urbanization. This happens when the natural water cycle cannot function properly in urban areas due to buildings, concrete and other surfaces that are preventing the water from reaching the ground, allowing it to soak into the siol.

- **Land cover changes**

  Land-cover changes are changes that are directly influenced by local, regional or global climate processes, whereas land-use changes are changes that are affected by humans.

- **Deforestation**

  Deforestation' happens when builders turn this land into non-forest use.When we remove trees from forests that have been growing for years, it reduces evapotranspiration, which is the sum of evaporation and plant transpiration from land and ocean surface to the atmosphere, leading to a possible reduction in precipitation.

Q.2

Ans: **Ground water Sustainability:** Groundwater sustainability is the development and use of groundwater resources to meet current and future beneficial uses without causing unacceptable environmental or socioeconomic consequences. OR
Groundwater sustainability is the development and use of groundwater to meet both current and future beneficial purposes without causing unacceptable consequences. It is important that we understand the factors that contribute to local, regional, or statewide groundwater shortages, the strategies that can be implemented to promote a sustainable groundwater supply, and what resources or tools are needed to implement these strategies successfully. It is time to take action to develop public understanding of the:

Factors affecting groundwater supplies and use

- Methods that promote the wise use of groundwater supplies
- Need to determine strategies that promote groundwater sustainability
- Need for cooperative efforts to fill data gaps and undertake priority research
- Need for increased collaborative educational efforts.

Rainwater Harvesting linked to ground water sustainability: Rain water harvesting (RWH) is the most traditional and sustainable method, which could be easily used for potable and

nonpotable purposes both in residential and commercial buildings. This could reduce the pressure on processed supply water which enhances the green living.
. In fact, it has been practised for many centuries: it is the collection and storage of rainwater for multiple use services.
Rainwater harvesting is gaining more and more recognition as a sustainable alternative to other water supply options. It is economically viable, socially compatible and environmentally friendly.
Rain water harvesting is related in a very healthy way to ground water sustainabily. It reduces pressure on ground and surface water sources and it can replenish/restore groundwater sources. In the light of climate change and increasing pressure on natural resources, rainwater harvesting can play a significant role in reducing and overcoming water scarcity worldwide.

Moreover Recharge of the ground water is a time consuming process, it take sufficient time to recharge ground water table. We cannot suddenly increase the ground water table after constructing any type of recharge structures. RWH is very beneficial concept in rural and urban areas, so we can prefer RWH system. This will help to recreate the source for depleting ground water resources. Also help to save the little amount of rain water which used to drain away from many years. Rain water harvesting is essential for humans and animals as well as for ground water depletion.

Q.3

Ans:

Quality Parameters for designing water supply system for community:

The main task of water supply systems is providing recipients with water of adequate quality and with sufficient pressure. The systems vary greatly in terms of size, layout, way of supply, or the characteristics of consumers. Various percentage shares of water usage during a day are characteristic of the individual elements of spatial development. All of these factors lead to the assessment of operational parameters characterizing a given system being so important, both at their design stage as well as over the course of their operation. Also important are calculations regarding the flow rate of water within the network, in which the assumed variant of mixing water flowing into the tank with stored water is important.
The following are the list of design parameter that are important in the design of water supply system:
(i). Maximum pressure limit: The taps and valves closed state, should be the maximum pressure condition for the system. Maximum head limits for the pipe work will be used to carry out the calculations.
(ii). Safe Yield: The safe yield is the minimum flow from the water source. It is important to not draw more than this supply from the system at any point.
(iii). Negative or Low Pressure Head: If the pressure head becomes negative at any point in the system then two things may happen. Firstly a siphon effect is occurring which is trying to suck

water into the system. Secondly, large negative pressures can cause air to come out of solution in the water and cause air-blocks.

(iv). Velocity Limits: The flow velocity in the pipelines should not be to great as particles suspended in the water will cause excessive erosion. Also if the velocity is too low then these particles will settle out of the flow and may clog the pipes at low points.

(v). Natural Flow : Natural flow may be allowed to occur in the system at some sections of pipe. Natural flow can be problematic in that the water velocity may exceed the limits set in parameter 4 above and/or increase the flow rate above the safe yield parameter 2.

(vi). Residual Head : The residual head at a tap stand or valve is important. If it's too high it will cause erosion of the valve and if it is too low then the flow will be minimal.

(vii). Air-blocks : These occur when there are topographic features between the source and the collecting tank that are lower than the collecting tank. Energy is lost from the system as these air-blocks are compressed and can result in no flow.

(viii). Cost : Wherever possible smaller pipe diameters should be used, as they are cheaper. Combinations of pipes can often produce cheaper solutions than using just one pipe size.