66475 Water Resource Engineering

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AIMS

- To provide understanding on the influence of the climatic condition of Bangladesh on its ground water and surface water flow
- To provide understanding of recharging of underground water and ascertain its necessity in Bangladesh.
- To enable to select a suitable source of water and method of irrigation for particular situation.
- To enable to select a suitable method of drainage for particular situation.
- To enable to select a suitable method for control of rivers and flood in Bangladesh.
- To understand rain water harvesting.

SHORT DESCRIPTION

Sources of water; Rainfall and run-off; Lifting of underground water; Storing and Recharging of ground/rain water; Irrigation and its effect; Well irrigation; Water requirements for crops; and quality of irrigation water; Storage reservoir; Dam and dyke; Irrigation canals; Silt deposit; Scouring; Canal works; Drainage; River training works; Flood and flood management and flood control; Irrigation projects in Bangladesh.

DETAIL DESCRIPTION

Theory:

1. Understand different hydrological terms.

1.1 Explain with neat sketch the hydrological cycle.
1.2 Explain the meaning of the following: Rainfall, Rainfall intensity and duration frequency relationship Run-off, Infiltration, Evaporation, Transpiration, Evapo-transpiration, Permeable and impermeable strata of soil, Ground water table, Precipitation, Aquifer.
1.3 Mention the characteristics of rainfall and run-off in Bangladesh.
1.4 Describe with sketches the various types of rain gauges.
1.5 List the factors affecting the run-off an area.
1.6 Determine average annual run-off of a catchments area from given data.

2. Understand the features of a well and recharging of ground water.

2.1 State the following terms with neat sketches: Cone of depression, Circle of influence, Draw down curve.
2.2 Express how to determine the yield of a well.
2. 3 Solve the problems regarding lifting water from well.
2.4 Define storing and recharging of ground water/rain water.
2.5 Mention the condition of recharging of ground water is required.
2.6 List the methods of recharging of ground water.
2.7 Mention the advantages and disadvantages of recharging of ground water.
2.8 Predict the need for recharging of ground water in Bangladesh.

3. Understand the significance of irrigation.

3.1 Explain the necessity of irrigation in Bangladesh.
3.2 Mention the benefits of irrigation.
3.3 Describe about the present development of irrigation in Bangladesh.
3.4 Name different types of irrigation including sub-divisions.
3.5 Describe flow irrigation through flexible pipe.
3.6 Differentiate canal or direct irrigation with reservoir (tank) or indirect irrigation.
3.7 Describe different methods for lifting water for irrigation manually and by power.
3.8 Mention the advantages and disadvantages of well irrigation.
3.9 Explain the necessity of tube-well irrigation in Bangladesh.
3.10 Mention the advantages and disadvantages of tube-well irrigation.

4. Understand the concept of storage reservoirs.

4.1 State the meaning of storage reservoir.
4.2 Explain the necessity of storage reservoir
4.3 Mention the requirements of an ideal reservoir.
4.4 Explain the meaning of commendable area and irrigable area.
4.5 Calculate the capacity of a storage reservoir by using appropriate methods.
4.6 Mention the factors that determine the height of the dam of a reservoir.
4.7 Mention the section of a dam of reservoir with different components.

5. Understand the features of dam, dyke and irrigation canal.

5.1 State dam, core wall, dyke and irrigation canal.
5.2 Mention the favorable conditions for location of an earthen dam/ masonry dam.
5.3 Mention the advantages and limitations of an earthen dam/masonry dam.
5.4 Describe the construction procedure of an earthen dam/dyke.
5.5 Mention the remedies for preventing the failure of an earthen dam/dyke.
5.6 Differentiate between dam and dyke.
5.7 State main, branch, distributor, field canal and canal lining.
5.8 Mention the points to be considered in fixing the alignment of an irrigation canal.
5.9 Describe with sketches the distributor system of irrigation canals.
5.10 Describe the steps for excavating a new canal and old canal.

6. Understand silt deposition & scouring.

6.1 State river morphology, silt, siltation and scouring.
6.2 Mention the causes of siltation.
6.3 Mention the merits and demerits of siltation.
6.4 Describe the methods of preventing silt deposition into river and canal.
6.5 Describe the removal methods of silt from the river and canal.
6.6 Differentiate between silt excluder and silt ejector.
6.7 Describe the effect of scouring.
6.8 Describe the methods of preventing scouring.

7. Understand the features of head works.

7.1 State the meaning of head works.
7.2 Name the different components of a head works.
7.3 Explain the functions of each of the component of a head works.

8. Understand the principles of drainage.

8.1 State the meaning of drainage.
8.2 Mention the different methods of drainage.
8.3 State the meaning of cross drainage works.
8.4 Mention the functions of cross drainage works.
8.5 Differtiate between aqueduct and super passage.
8.6 Mention the need for drainage in Bangladesh.

9. Understand the necessity of river training works.

9.1 State the meaning of river training.
9.2 Outline the objectives of river training works.
9.3 Mention the different methods of river training works.
9.4 Mention the functions of guide bank, groyne, spur, afflux, marginal bund and stone apron.
9.5 Explain the necessity of river training works in Bangladesh.

10. Understand the concept of flood and flood control.

10.1 State the meaning of flood.
10.2 Mention the causes of flood.
10.3 Mention the different methods of controlling flood.
10.4 Specify the causes of flood in Bangladesh.
10.5 Describe suitable method(s) for flood control in Bangladesh.

10.6 State coastal embankment project and inland river embankment project.
10.7 Describe the flood forecasting procedure in Bangladesh.

11. Understand different irrigation projects in Bangladesh.

11.1 Write short history of irrigation in Bangladesh.
11.2 Give an overview of Ganga-Kapatakhha (G-K) Project.
11.3 Give an overview of Teesta Barrage Project.
11.4 Give an overview of Chalan Beel Development Project.
11.5 Give an overview of Chandpur Irrigation Project.
11.6 Give an overview of Barisal Irrigation Project.
11.7 Give an overview of North Bengal Deep Tube Well Project.
11.8 Give an overview of Pabna Irrigation and Flood Control Project.

PRACTICAL:

1. Measure rainfall by rain gauge and determine the intensity of rainfall.
2. Disassemble and assemble common hand pump/Tara pump.
3. Install hand pump/Tara pump.
4. Draw neat sketch of cone of depression with draw down and circle of influence.
5. Draw neat sketch of rain gauges commonly used in Bangladesh.
6. Draw the section of a dam of a reservoir with components.
7. Draw neat sketch of distribution system of irrigation.
8. Draw neat sketch of head works with components.
9. Draw neat sketch of guide bank, groyne, spur, afflux, marginal bund and stone apron.
10. Prepare a model for a typical irrigation project.
11. Visit an irrigation and flood control project in Bangladesh.

REFERENCE BOOKS

1. Hydrology– Raghunath
2. Irrigation Engineering and Hydraulic structure– Santosh Kumar Garg
3. Introductory Irrigation– B C Punmia
4. Irrigation – Esrailson
5. Irrigation Engineering and Hydraulic Structure - Santosh Kumar Garg
6. Introductory Irrigation Engineering - B C Punnia
7. www.bwdb.gov.bd (For idea about mentioned project)