

**MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL**

Paper Code : CE(PC)603 Water Resources Engineering

UPID : 006733

Time Allotted : 3 Hours

Full Marks : 70

*The Figures in the margin indicate full marks.**Candidate are required to give their answers in their own words as far as practicable***Group-A (Very Short Answer Type Question)**

1. Answer any ten of the following :

[1 x 10 = 10]

- (I) A ridge canal is also called a _____
- (II) Write one remedial measure for water-logging.
- (III) What is the geological formation called that may contain water but does not contain any of the yields?
- (IV) What is Berm in canal section ?
- (V) What type of irrigation method can be used for both flat lands and relatively steep lands?
- (VI) The duty of irrigation water for a given crop is maximum: - _____
- (VII) The cubic metres of water that can be stored in an irrigation tank between FTL (Full Tank Level) and Sill level of the lowest supply sluice, is known as _____
- (VIII) The type of irrigation method which uses the supply ditch, borders, ridges is _____
- (IX) What is the line joining the static water levels in several wells excavated through a confined aquifer called?
- (X) What is the quantum of water that is contained in the soil pores which cannot be extracted by the gravity drainage?
- (XI) Which is the other name of perennial irrigation system?
- (XII) The maximum irrigation requirement of Rice crop is exhibited by its: - _____

Group-B (Short Answer Type Question)

Answer any three of the following :

[5 x 3 = 15]

2. A channel has two sides vertical and semi-circular bottom of 2 m diameter. Calculate the discharge of water through the channel, when depth of flow is 2 m. Take $C = 70$ and slope of bed as 1 in 1000 [5]
3. Define : Aquifuge [5]
4. The main canal from the headwork of a dam has been designed to carry a discharge of 40 m/s. At a certain location along the course of the canal, a drop of 4.0 m head is available. It is proposed to utilize the drop for generation of hydropower. Estimate how much kW (kilo watt) of energy can be generated assuming efficiency of machinery used as 75 percent. <https://www.makaut.com> [5]
5. Define [5]
 - a) Carrier canal
 - b) Feeder canal
6. Explain the problems associated with expansive soils while laying the canal lining and remedial measures. [5]

Group-C (Long Answer Type Question)

Answer any three of the following :

[15 x 3 = 45]

7. A trapezoidal channel with side slopes of 1: 2 has to be designed to convey $8.0 \text{ m}^3/\text{s}$ at a velocity of 1.0 m/s, so that the amount of concrete lining for the bed and sides is the minimum [15]
 - (i) Calculate the area of lining required for one metre length of the channel.
 - (ii) If the roughness coefficient is $n = 0.015$, calculate the bed slope of the channel for uniform flow.
8. (I) The depths of penetrations along the length of a border strip at points 30 metres apart were probed. Their observed values are 2.0, 1.9, 1.8, 1.6 and 15 metres Compute the water distribution efficiency. [8+7]
 (II) If rice requires about 10 cm depth of water at an average interval of about 10 days, and the crop period for rice is 120 days, find out the delta for rice.
9. (i) A watercourse has culturable commanded area of 2600 hectares, out of which the intensities of irrigation for perennial sugarcane and rice crops are 20% and 40%, respectively. The duties for these crops at the head of watercourse are 750 hectares/cumec and 1800 hectares/cumec, respectively. Find the discharge required at the head of watercourse if the peak demand is 120% of the average requirement. [15]

(ii) Explain the modes of failure in gravity dams and earthen dam.

10. A stream of 130 litres per second was diverted from a canal and 100 litres per second were delivered to the field. An area of 1.6 hectares was irrigated in 8 hours. The effective depth of root zone was 1.7 m. The runoff loss in the field was 420 cubic meter. The depth of water penetration varied linearly from 17 m at the head end of the field to 1.1 m at the tail end. Available moisture holding capacity of the soil is 20 cm per metre depth of soil. It is required to determine the water conveyance efficiency, water application efficiency, water storage efficiency, and water distribution efficiency, Irrigation was started at a moisture extraction level of 50% of the available moisture. [15]
11. What are the solutions of water logging . [15]

*** END OF PAPER ***

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