

**B.TECH**  
**(SEM VI) THEORY EXAMINATION 2017-18**  
**IRRIGATION & DRAINAGE ENGINEERING**

*Time: 3 Hours*

*Total Marks: 100*

**Note:** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1. Attempt *all* questions in brief. 2 x 10 = 20**

- a. What do you mean by irrigation?
- b. What are the benefits of irrigation?
- c. What is surface irrigation?
- d. What are different methods of measuring irrigation water on the farm?
- e. What do you mean by drainage?
- f. What are the objectives of drainage?
- g. What are the instruments is used for measurement of evaporation
- h. Enlist different methods of measurement of soil moisture?
- i. How do you determination depths in furrows by which method?
- j. What is Bio-Drainage?

**SECTION B**

**2. Attempt any *three* of the following: 10 x 3 = 30**

- a. Derive Israelson's equation for border irrigation?
- b. How do you measure irrigation water with the help of Parshall flume? Differentiate between submerged orifice and free flow orifice with neat diagram
- c. How do you measure irrigation water with the help of Parshall flume?
- d. Differentiate between gridiron and interceptor drains?
- e. A stream of 135 lit/sec was delivered from a canal and 100 lit/sec was diverted to the field. An area of 1.6 ha was irrigated in 8 hrs. The effective root zone depth is 1.8 m. The runoff loss in the field was 432 m<sup>3</sup>. The depth of water penetration varied linearly from 1.8 m at the head of the field to 1.2 m at the tail end. Available moisture holding capacity of the soil is 20 cm per m depth of soil. 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?

**SECTION C**

**3. Attempt any *one* part of the following: 10 x 1 = 10**

- (a) Explain the terms 'Crop water use efficiency' and 'Water storage efficiency'
- (b) List out the various methods of determination of hydraulic conductivity and derive the equation for hydraulic conductivity by auger-hole method with neat sketch

4. **Attempt any *one* part of the following:** **10 x 1 = 10**
- (a) Determine the size of the tile required at the end of a 300 m long tile line, if the drainage coefficient is 1.2 cm, grade is 0.2 percent and tile spacing is 60 m. Mannings roughness coefficient for tile drains is 0.04.
  - (b) Derive Ernst equation with neat sketch for steady state flow.
5. **Attempt any *one* part of the following:** **10 x 1 = 10**
- (a) Define salt balance? Classification and reclamation of saline and alkaline soils - explain?
  - (b) Differentiate between Leaching Requirement and Leaching Ratio? Calculate the Delta for kharif crop having Duty as 2500 ha/cumec. (B for kharif=123d)
6. **Attempt any *one* part of the following:** **10 x 1 = 10**
- (a) Design an irrigation channel to carry 45 cumec of discharge by Kennedy's method. The channel is to be laid out at slope of 1 in 4500. The critical velocity ratio (CVR) of the soil is 1.1. Use cutter's coefficient  $n = 0.023$ . Assuming side slopes of the channel is 0.5:1.
  - (b) Explain about components and hydraulics of border irrigation method.
7. **Attempt any *one* part of the following:** **10 x 1 = 10**
- (a) Differentiate between submerged orifice and free flow orifice with neat diagram.
  - (b) Derive Hooghoudt's equation for spacing of tile drains under steady state conditions with neat sketch. Also state assumptions.