

B.Tech. Civil (Water Resources Engineering)

Term-End Examination

June, 2018

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ET-533(A) : IRRIGATION ENGINEERING

Time : 3 hours

Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks. Choose suitable data, if not given. Use of non-programmable scientific calculator is permitted.

1. Distinguish between the following : $7 \times 2 = 14$
- (a) Irrigation scheduling and Irrigation frequency
 - (b) Hygroscopic water and Capillary water
 - (c) Steady and Non-steady state drainage
 - (d) Vertical well type drop and Vertical rectangular drop
 - (e) Field capacity and Wilting point
 - (f) Void ratio and Soil porosity
 - (g) Potential evapotranspiration and Actual evapotranspiration

2. (a) Trace the history of development of irrigation during various plan periods since the independence of India. 10
- (b) Explain briefly the procedure of gravel pack design for a tube well. 4
3. Write short notes on any *four* of the following: $4 \times 3 \frac{1}{2} = 14$
- (a) Land levelling and grading
- (b) Soil moisture content and degree of saturation
- (c) Classification of canals
- (d) India's water budget
- (e) Weather and climate
4. (a) After how many days will you supply water to soil in order to ensure sufficient irrigation of the given crop, if 7
- (i) Field capacity of the soil = 28%
- (ii) Permanent wilting point = 13%
- (iii) Density of soil = 1.3 gm/cc
- (iv) Effective depth of root zone = 70 cm
- (v) Daily consumptive use of water for the given crop = 12 mm
- Take readily available moisture as 80% of available moisture.
- (b) Explain how various factors affect evaporation from water bodies, and also from soils. 7

5. (a) The culturable commanded area of a watercourse is 1200 hectares. Intensities of irrigation for sugarcane and wheat crops are 20% and 40% respectively. The duties for the crops at the head of the watercourse are 730 hectares/cumec and 1800 hectares/cumec respectively.

Find :

- (i) The discharge required at the head of the watercourse.
- (ii) Determine the design discharge at the outlet, assuming a time factor equal to 0.8. 10

- (b) Differentiate between alluvial and non-alluvial canals. 4

6. (a) Describe the drip irrigation method. Also discuss the advantages and disadvantages of this method. 7

- (b) A pump is installed on a well to lift water and to irrigate rice crop, sown over 3 hectares of land. If duty for rice is 864 hectares/cumec on the field and pump efficiency is 48%, determine the minimum required input (H.P.) of the pump, if the lowest well water level is 8 metres below the highest portion of the field. Assume negligible field channel losses. 7

7. (a) Discuss the criteria for the selection of pumps for irrigation. 7
- (b) What are the different infiltration models ? Explain in detail Horton's model. 7
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