

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII • EXAMINATION – WINTER • 2014****Subject Code: 170602****Date: 02-12-2014****Subject Name: Irrigation Engineering****Time: 10:30 am - 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Describe with the help of sketch various forms of soil moisture. Which of these moisture is mainly available for utilization by the plants? **07**
- (b)** Explain the terms (i) Duty (ii) Delta and (iii) Base period. Derive the relation between Duty, Delta and Base period. **07**
- Q.2 (a)** Explain the salient features of the drip irrigation system. What are the advantages and disadvantages of the drip irrigation? **07**
- (b)** Explain the procedure for designing an irrigation channel using Kennedy's theory, when Q, N, m & S are given. **07**

**OR**

- (b)** The base period, intensity of irrigation and duty of various crops under a canal system are given in table below. Determine the reservoir capacity if the canal losses are 20% and reservoir losses are 12%. Culturable commanded area is 20,000 hectares. **07**

| Crop       | Base period (days) | Duty of water at the field (hectare/cumec) | Intensity of irrigation (%) |
|------------|--------------------|--------------------------------------------|-----------------------------|
| Wheat      | 120                | 1800                                       | 20                          |
| Sugarcane  | 360                | 1700                                       | 20                          |
| Cotton     | 180                | 1400                                       | 10                          |
| Rice       | 120                | 800                                        | 15                          |
| Vegetables | 120                | 700                                        | 15                          |

- Q.3 (a)** Explain the procedure for designing an irrigation channel using Lacey's theory. **07**
- (b)** Design an irrigation channel by Kennedy's theory to carry a discharge of 50 cumec. Take  $N = 0.0225$  and  $m = 1.05$ . Bed slope is 0.2m per kilometer. **07**

**OR**

- Q.3 (a)** What is canal lining? Explain advantages and disadvantages of canal lining. **07**
- (b)** Design a lined concrete channel, trapezoidal in section to carry a discharge of 200 cumec at a slope of 30cm/km. The Manning's  $N = 0.017$ , and side slopes are 1.5:1. The limiting velocity in the channel is 2m/s. **07**

- Q.4 (a)** Explain causes of failure of weirs on pervious foundation and their remedies. **07**
- (b)** Sketch the layout of a typical diversion head works and describe briefly the functions of the various components of diversion head works. **07**

**OR**

- Q.4 (a)** Describe Bligh's creep theory for the design of weir over pervious foundation. **07**
- (b)** What are the ill effects of water logging? How do you prevent water logging? **07**

- Q.5 (a)** Describe with the help of neat sketches the various types of cross drainage works. **07**
- (b)** What is canal fall? Why is it necessary to provide a fall in a canal? Explain with sketch Ogee fall. **07**

**OR**

- Q.5 (a)** List the various methods for estimating maximum flood discharge and explain unit hydrograph method. **07**
- (b)** What is an escape? What are different type of escapes? Explain working of each type. **07**

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