

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VII Examination-Nov/Dec.-2011

Subject code: 170602

Date: 22/11/2011

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) Explain the procedure of designing an irrigation channel with Kennedy's theory, when Q , N , m and S are given. **07**
- (b) Explain the terms (i) Duty (ii) Delta and (iii) Base period. **07**
Derive the relation between Duty, Delta and Base period.

- Q.2** (a) Describe the method of design of a lined canal. **07**
- (b) Explain Khosla's method of independent variables. **07**

OR

- (b) Write the design features for Boarder Strip Flooding irrigation method. **07**

- Q.3** (a) Describe the following irrigation methods with sketches
- (i) Check basin flooding method. **03**
- (ii) Drip irrigation method **04**
- (b) (i) Find the time required to cover an area of 0.1 hectares when a tube well is discharging at the rate of 0.03 cumec for irrigating rabi crop. Average depth of flow is expected to be 7.5 cm. Average infiltration rate for the soil may be taken as 5 cm/hour. **04**
- (ii) Furrow 100m long and 1m apart having longitudinal slope of 0.3 percent are initially irrigated by a non-erosive stream for 80 minutes. The stream size is then reduced to 40% and continued for another 35 minutes. Determine the average depth of irrigation. **03**

OR

- Q.3** (a) Describe the method of designing an irrigation canal based on Lacey's theory. **07**
- (b) Using Kennedy's theory, design a channel section for the following data: **07**
Discharge, $Q=25$ cumec, Kutter's $N=0.0225$,
Critical velocity ratio, $m=1$, Side slope = $1/2:1$ and
Bed slope, $S=1/5000$

- Q.4** (a) (i) Explain the term "Diversion Head Work" and clearly mention its different functions. **04**
- (ii) Explain Bligh's Creep Theory in details. **03**

- (b) A canal takes off from a reservoir to irrigate the areas as shown in the Table below. 40% of the water required for irrigation is assumed to be available directly from precipitation. Channel conveyance losses are 15%. Reservoir losses are 10%. What would be the capacity of the reservoir needed? (The reservoir to be filled only once a year.) **07**

Crop	Base period (days)	Duty at field (ha/cumec)	Area under Crop (ha)
Wheat	120	1800	500
Sugarcane	320	800	600
Rice	120	900	300
Cotton	200	1400	1200
Bajra	100	1200	500

OR

- Q.4 (a)** State and explain the cause of failure of Structure founded on permeable soil. **07**
- (b)** A weir has a solid horizontal floor length of 50 m with two lines of cutoff 8 m depth, below the riverbed at its two ends. The floor thickness is 1 m at the upstream end and 2 m at the downstream end, with its upper level being in flush with the river bed. For an effective head of 5 m over the weir, calculate the uplift pressure at the two inside corner points (junction of bottom of floor with the cutoff) and also exit gradient. **07**

- Q.5 (a)** Describe with the help of sketches various types of Cross-drainage works. **07**
- (b)** (i) What do you understand by a fall in canal? Why it is necessary? **04**
(ii) What are the causes of water logging? **03**

OR

- Q.5 (a)** What is weir? How does it differ from a barrage structure? Give relative advantages and disadvantages with their salient features. **07**
- (b)** (i) What are the functions of a canal head regulator? **04**
(ii) Explain the terms with a sketches wherever applicable **03**
(1) Sheet piles (2) D/S protection (3) U/S protection.
