Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–VI • EXAMINATION – WINTER • 2014

Subject Code: X 60603 **Date: 04-12-2014**

Subject Name: Irrigation Engineering

Time: 02:30 pm - 05:00 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)** Discuss briefly the benefits as well as the ill-effects of irrigation. **07**

(b) What are the different types of irrigation systems? Discuss each of these systems briefly. **07**

Q.2 **(a)** Discuss the various sub-surface irrigation methods. Indicate their limitations. **07**

(b) Find the field capacity of a soil for the following data **07**

(i) Depth of root zone = 2 meter
(ii) Existing water content = 5 %
(iii) Dry density of soil = 1500 kg/m^3
(iv) Water applied to soil = 600 m^3
(v) Water lost due to evaporation and deep percolation = 10 %
(vi) Area of land irrigated = 900 m^2.

OR

(b) The gross commanded area for an irrigation canal is 20000 hectares out of which 75 % is culturable commanded area. The intensity of irrigation is 40 % for rabi and 10% for rice. If kor period is 4 weeks for rabi and 2.5 weeks for rice, determine the outlet discharge, outlet factors for rabi and rice may be assumed as 1800 hectares/cumecs and 775 hectares/cumecs. Also calculate delta for each course. **07**

Q.3 **(a)** Discuss briefly the factors affecting the choice of the method of irrigation. **07**

(b) Describe in detail sprinkler method of irrigation. Indicate the advantages and limitations of the method. **07**

OR

Q.3 **(a)** The base period , intensity of irrigation and duty for various crops under a canal system are given in the table below. Determine the reservoir capacity if the culturable commanded area is 40000 hectares, canal losses are 20 % and reservoir losses are 10 %. **07**

crop	Base period (days)	Duty of water at the field (hectares/cumec)	Intensity of irrigation (%)
Wheat	120	1800	20
Sugarcane	360	1700	20
Cotton	180	1400	10
Rice	120	800	15
vegetables	120	700	15

	(b)	After how many days will you order irrigation in order to ensure healthy growth of crops, if (i) Field capacity of soil = 29 % (ii) Permanent wilting percentage = 11 % (iii) Density of soil = 1300 kg/m3 (iv) Effective depth of root zone = 700 mm (v) Daily consumptive use of water for the given crop = 12 mm. For healthy growth moisture content must not fall below 25 % of the water holding capacity between the field capacity and the permanent wilting point.	**07**
Q.4	**(a)**	Differentiate between a permanent canal and a inundation canal.	**07**
	(b)	Distinguish between a ridge canal and a contour canal.	**07**
		OR	
Q.4	**(a)**	Design an irrigation channel to carry a discharge of 5 cumecs. Assume N = 0.0255 and m =1. The channel has a bed slope of 0.2 meter per kilometer.	**07**
	(b)	A canal has a bed width of 8 m full supply depth 2.5 m, bank width 3m, cutting slope 1:1, filling slope1.5:1 and free board 0.5 m calculate balancing depth.	**07**
Q.5	**(a)**	Discuss the various measures which may be taken to prevent water logging as well as to relive the land already water logged.	**07**
	(b)	Write a note on economics of channel linning.	**07**
		OR	
Q.5	**(a)**	What is canal escape? what are the different types of canal escapes?	**07**
	(b)	What is a cross regulator? what are the functions of a cross regulator?	**07**

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