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CE 131601

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2018

**B.Tech. 6th Semester End-Term Examination
IRRIGATION ENGINEERING**

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer Question No.1 and any *six* from the rest.

1. Fill in the blanks : (10 × 1 = 10)
- (a) The ratio of number of days the canal has actually run to the number of days of irrigation period is called _____.
- (b) Culturable Command Area is _____ than the Gross Command Area
- (c) An irrigation structure called _____ is constructed at a position where a canal has to cross above a natural drainage.
- (d) _____ method of irrigation gives very good yield for some crops like potatoes.
- (e) Base period of wheat is 150 days and 6.0cm water is required after every 36 days. The value of Delta for wheat is _____

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- (f) _____ is the vertical distance between Full Supply Level and top of bank of a Canal.
- (g) A channel is said to be in _____ when there is neither silting nor scouring taking place.
- (h) The velocity which does not produce silting or scouring is called _____.
- (i) The main function of a _____ is to separate the undersluice from weir Proper.
- (j) The major resisting force in a gravity dam is _____.
2. (a) Define irrigation. Discuss advantage and ill effect of irrigation. (1 + 3 = 4)
- (b) What is meant by 'Duty and Delta' of canal water. Describe the factors which affect the duty. (2 + 3 = 5)
- (c) Explain the following terms as used in relation to water requirement of crops.
- (i) Base period
- (ii) Intensity of irrigation
- (iii) Consumptive use
- (iv) Cash crops. (6)
3. (a) Classify the water present in soil. What is soil moisture tension? (2 + 2 = 4)
- (b) What do you understand by crop rotations? What are its advantages? (2 + 2 = 4)
- (c) The base period, intensity of irrigation and duty of water for various crops under a canal system are given below. Determine the reservoir

capacity if the culturable command area is 50000 hectares, canal losses are 5% and reservoir losses 8%. (7)

Crop	Base period in days	Duty (hec/cumec)	Intensity of irrigation
Wheat	120	1900	25%
Rice	120	1000	10%
Sugarcane	330	2500	15%

4. (a) A water course has a culturable command area of 1200 hectares. The intensity of irrigation for crop A is 40% and for B is 35%, both the crops being Rabi crops. Crop A has a Kor period of 20 days and crop B has Kor period of 15 days. Calculate the discharge of the water course if the kor depth for crop A is 10cm and for crop B it is 16cm. (9)
- (b) Define :
- Field capacity
 - Wilting point
 - Optimum water. (3)
- (c) List various considerations for alignment of a canal. (3)
5. (a) Discuss relative advantages and disadvantages between 'Flow irrigation' and 'Lift irrigation. (4)
- (b) Discuss necessity of canal lining. (4)
- (c) Describe sprinkler irrigation and cite its various advantages over the conventional irrigation system. (7)
6. (a) While doing a recuperation test, the water level in an open well was depressed by pumping up to 3.0 m. The water level was raised by 1.5 m within 50 minutes, just after stopping the pumping. Determine : (4 + 4 = 8)

- (i) Yield from the well, if the diameter of the well is 2.5 m and the depression head is 3.3 m
- (ii) The diameter of the well to give 1.5m litres/sec discharge under a depression head of 3.0 m.
- (b) Explain the procedure of designing a channel with Kennedy's theory. (7)
7. (a) Design a trapezoidal shaped concrete lined channel to carry 70 cumecs discharges. The side slopes of the channel are 1.5:1 and longitudinal slope may be taken as 0.3 per km. Assume the limiting velocity as 1.5 m/sec and value of 'N' as 0.012. (9)
- (b) What is meant by water logging? What are its ill effect? Describe two anti- water logging measures with sketches. (2 + 2 + 2 = 6)
8. (a) Design a canal section for the following data:
 Discharge $Q = 30$ cumecs
 Silt factor $f = 1.00$
 Side slope $S = 1/2 : 1$
 Find also the longitudinal slope. (9)
- (b) Distinguish clearly between a shallow well and a deep well. What is an open well. (3 + 3 = 6)
9. (a) What are cross drainage works? Why are they necessary? When a syphon aqueduct is constructed? (2 + 2 + 1 = 5)
- (b) What is a canal fall? (2)
- (c) What is the purpose of regulation works? (3)
- (d) Sketch a layout of a storage and a diversion headwork with components. ($2\frac{1}{2} + 2\frac{1}{2} = 5$)