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**CE 131601**

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Azara, Hatkhowapara,  
Guwahati -781017

Roll No. of candidate

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**2019**

**B.Tech. 6<sup>th</sup> Semester End-Term Examination**

**Civil Engineering**

**IRRIGATION ENGINEERING**

Full Marks – 100

Time – Three hours

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

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

(10 × 1 = 10)

1. (i) The moisture content of the soil below which plants cannot extract sufficient water for their requirement is called
- (a) Field capacity
  - (b) Saturation capacity
  - (c) Temporary wilting point
  - (d) Permanent wilting point

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- (ii) Water present in the soil which cannot be removed by heating is called
- (a) Gravity water
  - (b) Capillary water
  - (c) Hygroscopic water
  - (d) Free water
- (iii) Which of the following may lead to water logging of the fields
- (a) Poor drainage
  - (b) Excessive seepage from nearby reservoirs and canals
  - (c) Over irrigation
  - (d) All of the above
- (iv) Which of the following is not a Rabi crop
- (a) Sugar Cane
  - (b) Ground nut
  - (c) Wheat
  - (d) Potato
- (v) The most desirable alignment of an irrigation canal
- (a) The ridge line
  - (b) Contour line
  - (c) Valley line
  - (d) A straight line
- (vi) The entry of the silt into the canal can be controlled by
- (a) Silt extractor
  - (b) Silt excluder
  - (c) Silt ejector
  - (d) The head regulator

- (vii) Falls in the canals are provided when
- (a) Natural ground slope is same as the design slope
  - (b) Natural ground slope is more as the design slope
  - (c) Natural ground slope is less as the design slope
  - (d) The canal runs in deep cutting

(viii) Syphon aqueduct is selected as the cross-drainage work when the canal bed level

- (a) is below the maximum flood level in the drain
- (b) is above the maximum flood level in the drain
- (c) is below the bed level of the drain
- (d) None of the above

(ix) The component of a diversion headworks which facilitates the migration of fish from u/s or d/s to the other side is known as

- (a) Fish net      (b) Fish channel
- (c) Fish ladder   (d) Fish pond

(x) The net irrigation requirement of a crop is 64mm. If the field application losses and the conveyance losses are each 20%, what's the depth of water to be applied?

- (a) 80 cm      (b) 100 cm
- (c) 128 cm     (d) 76.8 cm

2. (a) What is the necessity for irrigation? Describe aim of irrigation. (5 × 3 = 15)
- (b) Describe with the help of a diagram various forms of a soil moisture.
- (c) Write a brief note on the functions of soil water.
- (d) Write note the following
- (i) G.C.A. **BINA CHOWDHURY CENTRAL LIBRARY,  
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- (ii) C.C.A.
- (iii) Intensity of irrigation
- (e) What is a crop season? How many crop seasons you can recognize in our country? What are the various ways of aligning irrigation canals mentioning merit main crops of each season?
3. (a) What are the various ways of aligning irrigation canals mentioning merits and demerits of any one alignment. (5)
- (b) Design a lined canal having the following data (10)
- (i) Full supply discharge = 200 cumecs
- (ii) Side slope = 1.25 : 1
- (iii) Bed slope = 1 in 5000
- (iv) Rugosity co-efficient = 0.018
- (v) Permissible velocity = 1.75 m/sec
4. (a) Derive the relationship for delta, duty and base period. (2)
- (b) List the steps involved in the design procedure of unlined canal in alluvial soil by the Kennedy's theory. State the drawbacks in Kennedy's theory. (5)

- (c) A reservoir has to supply irrigation water to 40000 hectares. Calculate the storage required in the reservoir to meet the irrigation demand of various crops as detailed below (8)

Crop	Base period (day)	Duty (ha/cumec)	Intensity of irrigation (%)
Wheat	120	2400	20
Rice	140	1000	15
Maize	100	1800	20
Cotton	200	3000	10

Reservoir losses may be taken as 5% and conveyance losses as 15%.

5. (a) What do you understand by duty of irrigation water? What measures can you take to improve duty of irrigation water? (7)
- (b) What are the advantages and disadvantages of sprinkler irrigation? Describe the special use of sprinklers in frost protection of crops. (5)
- (c) What is canal fall? Where are they located? (3)
6. (a) What is consumptive use of water by the crops? What are the various factors on which consumptive use depends? Explain how you can determine consumptive use by using tanks and lysimeters. (7)
- (b) Draw a layout of diversion headworks and label the various components. (6)

- (c) In a canal irrigation project, 76% of the C.C.A. remained without water during Kharif season, 58% of C.C.A. remained without water during Rabi season in a particular year, Rest of the areas got irrigated in each drop crop respectively. What is the intensity of irrigation for the project in that year. (2)
7. (a) What do you understand by crop rotation? Discuss its advantages. (5)
- (b) Distinguish between the following (4)
- (i) Aqueduct and Siphon Aqueduct
- (ii) Super passage and Siphon
- (c) What do you understand by water logging of a land? Write five causes of water logging. Explain any one anti-water logging measure you suggest. (6)
8. (a) What are the various water application methods for irrigating a field? With the help of appropriate sketches, describe any one method. (5)
- (b) Determine the frequency of irrigation from the following data (5)
- (i) Field capacity of soil = 35%
- (ii) Permanent wilting point = 18%
- (iii) Dry density of soil =  $1.5 \text{ gm/cm}^3$
- (iv) Depth of root zone = 70 cm
- (v) Daily consumptive use of water = 17 mm
- (vi) Assume any other data, not given
- (c) Write a note on inundation canal and write the advantages and disadvantages of inundation canal. (5)

9. (a) Distinguish between a shallow well and a deep well. Make comparison of well irrigation and canal irrigation. (6)

(b) Design a channel section with the following data. (9)

(i) Full supply discharge = 10 cumecs

(ii) Mean diameter of silt particles

(iii) Side slope =  $\frac{1}{2} : 1$

Find also the bed slope of the channel.

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