

CIVIL ENGINEERING

VI Semester

CE 9352 – Irrigation Engineering

(Regulation 2008)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

Part – A

10X2=20 Marks

1. Give the cross section of a major distributary canal in filling with cement concrete lining.
2. Name any one indicator plant used for the determination of permanent wilting point and state how is it determined?
3. State the method used to estimate the pan evaporation by the Ministry of Agriculture, India.
4. Sketch the plot of moisture content of soil Vs. stage of crop growth, which is helpful in understanding the irrigation needs of crops.
5. Define regime channels.
6. List the design criteria used for the construction of a head regulator.
7. Lining of a canal reduces the seepage losses – Substantiate hydraulically.
8. What is laser leveling? Why is this gaining importance?
9. Name any four participatory rural appraisal tools that are being used in the field to collect data from a farmer.
10. Give a brief about the Water Users' Association.

Part – B

5x16=80 Marks

11. (i) Calculate the seasonal consumptive use for a wheat crop sown on 1st November and harvested on 20th March. (use the appropriate method)
(10)

Month	Mean monthly air temperature (°C)	Heat Index	Correction factor	Crop coefficient
January	18.50	6.90	0.90	0.50
February	20.20	9.95	0.85	0.70
March	29.75	12.60	1.00	0.75
April	32.40	15.26	-	-
May	37.85	16.75	-	-
June	30.74	13.38	-	-
July	29.12	14.53	-	-
August	28.70	14.10	-	-
September	28.47	14.00	-	-
October	25.91	12.70	-	-
November	23.26	11.17	0.90	0.65
December	21.85	8.70	0.91	0.60

- (ii) Bring out the relationship between soil-water-plant-atmosphere continuum.
(6)

12. (a)(i) With neat sketches describe the principle and procedure of the electrical resistivity method used for soil moisture measurement. (16)

(OR)

- 12.(b)(i) Give an account of the pressures that exists within a soil mass, which aid in the flow of water. (8)
 (ii) Compare and contrast the National Water Policy 2002 with that of the Alternate Water Policy, 2012, in the context of irrigation. (8)

- 13.(a)(i) Sketch a diversion headwork and write a brief about each of its components. (16)

(OR)

- 13.(b)(i) Explain a modular outlet and a non-modular outlet with examples. (8)
 (ii) A channel has to be designed to carry a discharge of 45 cumecs. The silt factor is taken as one and the side slope of the channel is $\frac{1}{2} : 1$. Find out the longitudinal slope too. (Use Lacey's theory) (8)

- 14.(a)(i) With neat sketches detail about any two surface irrigation methods. Provide sketches for the water distribution pattern also. (8)
 (ii) Determine the size of the outlet of a 10 ha drainage system, if the drainage coefficient is 1 cm and the tile grade is 0.4%. Assume the rugosity coefficient for the tile as 0.011. (8)

(OR)

- 14.(b)(i) The chemical analysis of water samples obtained from a bore well in an area located within a buffer zone of 200m from the seashore has shown the following results.

Constituents present	Ca	Mg	Na	HCO ₃	CO ₃	SO ₄	Cl
Values (mg/l)	55	17	91	239	24	49	79

The pH is 8.5; electrical conductivity is 750 micro siemens/cm at 25°C. Calculate SAR, %Na, RSC and indicate the classification of irrigation water. (10)

- (ii) Discuss on the methods used for the reclamation of salt-affected soils. (6)
- 15.(a)(i) Calculate the conveyance efficiency and field application efficiency when a stream of 110 lit/sec received at the farm gate after being diverted from a canal delivered 85 lit/sec to the field. During irrigation to the crop for 9 hrs, 150 and 115 cumecs of water is respectively lost by runoff and deep percolation. If the depth of penetrations along the length of the broader strip at points 20m apart were found to be 3.0, 2.1, 1.9, 1.5 and 1.2 meters, compute the water distribution efficiency too. (10)
 (ii) Write a note on the on-farm development activities taken up by the Agricultural Engineering Department. (6)

(OR)

- 15.(b)(i) Explain the methods of irrigation scheduling. (8)
 (ii) Describe the paradigm shift that is taking place in irrigation water management in India. (8)