Ref. No. **Ex/CE/5/T/205/2017**

BACHELOR OF CIVIL ENGINEERING (EVENING) EXAMINATION 2017

(Second Year-Evening, Second Semester)

IRRIGATION ENGINEERING

Time: Three Hours | Full Marks 100 (50 marks for each part)

Use a separate Answer-Script for each part

No. of questions		PART I (50 Marks)	Marks
		*Answer any **TWO** questions from this PART. Assume suitable values for the parameters if not supplied.*	
1	(a)	When a land said to be water-logged area? What are the ill effects of water-logging? Explain briefly.	2+3=5
	(b)	Explain the causes of water-logging.	10
	(c)	Explain the controlling measures for water-logging.	10
2	(a)	Define the concept of regime channel. Discuss Kennedy's consideration regarding regime channel.	1+3=4
	(b)	Find out normal water depth and velocity in a canal carrying a discharge of 15 cumecs and having bed width 5.5 m. Assume Manning's n=0.0225, Bed slope=0.0015 and side slope 1.5 (H): 1(V).	8
	(c)	Design an irrigation canal to carry 44 cumecs at a slope of 1 in 5500, considering Kutter's n= 0.022 and CVR=0.90.	8
	(d)	Estimate the resultant tractive force in a rippled bed canal.	2
	(e)	An irrigation canal carries a discharge of 50 cumecs adopting the available ground slope of 1.5×10^{-4}. The canal bed material has a median size of 2.00 mm. Recommend the size of coarser material to be excluded from the canal for its efficient functioning.	3
3	(a)	Prove that the shear stress required in moving a grain on the bank is less than the shear stress required to move the grain on bed.	5
	(b)	Design a regime channel for a discharge of 60 cumecs and average grain size diameter is 0.5mm. Also calculate the depth of scour. Use Lacey's theory in both the cases.	8+2=10
	(c)	Design an irrigation canal to carry 50 cumecs at a slope of 1 in 6500, considering Kutter's n= 0.0225 and CVR=0.95. Geologically it was found that only 1.2m depth of cutting is possible in the stretch of the canal. In such a condition recommend a method of construction to accommodate the above designed canal.	10

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IRRIGATION ENGINEERING

Time: Three Hours | Full Marks

No. of questions	PART II	Mar

(Answer any two questions and illustrate your answer with neat sketch and figures wherever necessary. Assume suitable values for the parameters if not supplied)

1 (a) Determine the time required to irrigate a strip of land of 0.04 hectares in area from a tube well with a discharge of 0.02 cumec. The infiltration capacity of the soil may be taken as 5 cm/hr, and the average depth of flow on the field as 10 cm. 6

(b) With the help of graphical diagram explain the interrelationship among: Field capacity moisture content, permanent wilting point, available moisture content, non available moisture content, readily available moisture content and optimum moisture content. 5

(c) After how many days water supply is needed to soil in order to ensure sufficient irrigation of a given crop for following field conditions: Field capacity of soil= 30 %, Dry density of soil in average = 1.65 gm/cm^3, permanent wilting point = 15%, effective depth of root zone = 80 cm, daily consumptive use of water for given crop = 1.1 cm, readily available moisture = 80% of the available moisture. 6

(d) Distinguish between hygroscopic water and gravitational water and explain which of these two types is useful for plant growth. 4

(e) How is the flow irrigation different from lift irrigation? 4

2 (a) Define 'Delta' and 'Duty' and derive their relationship. What are the factors on which duty depends? 2+4+4=

(b) The C.C.A for a distributary is 12000 hectares. The intensity of irrigation for Rabi (wheat) is 40% and for kharif (rice) is 15%. If the total water requirement of the two crops are 37.5 cm and 120 cm and their periods of growth are 160 and 140 days respectively.

(i) Determine the outlet discharge from average demand consideration.

(ii) Also determine the peak demand discharge 8

Assuming that " the kor water depths'' for two crops are 13.5 cm and 19 cm and their kor periods are 4 weeks and 2 weeks respectively.

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(Second Year, Second Semester)

IRRIGATION ENGINEERING

Time: Three Hours | Full Marks 50

No. of questions	PART II	Marks
	(c) What is canal lining? What are the advantages of canal lining?	2+5=7
3. (a)	Describe reclamation of water logged and salt affected lands. What are the advantages of tile drain?	4+4=8
	(b) In a tile drainage system, the drains are laid with their centers 1.5 m below ground level. The impervious layer is 9.5 m below the ground level and the average annual rainfall in the area is 85 cm. If 1% of the annual rainfall is to be drained in 24 hours to keep the highest position of the water table to 1metre below ground level, determine the spacing of the drain pipes. Coefficient of permeability may be taken as 0.001 cm/sec.	8
	(c) It is proposed to line a channel. Work out the economics of concrete lining, if following data are given: Length of irrigation season = 150 days Perimeter of canal lining =4.47 m Savings in seepage loss by lining the canal = 1.5 percent per km Cost of water = Rs. 150.00 per hectare metre Cost of concrete lining = Rs. 16.00 per sq.m Cost of reshaping and trimming canal= Rs. 4.00 per sq.m Life of lining= 40years Interest rate= 7% Annual maintenance and operatinal cost (per km per year) For unlined canal in earth = Rs. 1000.00 And for concrete lined canal=Rs. 200.00 And other additional benefit = Rs. 350.00	9