

**BACHELOR OF ENGINEERING (CIVIL ENGINEERING) EXAMINATION 2024**

(Evening, Second Year, Second Semester)

**IRRIGATION ENGINEERING**

Time: Three Hours

Full Marks 100

Q No.	Attempt all questions. Assume suitable values for the parameters if not supplied.		Marks
1	(a)	Compare Kennedy's theory and Lacey's theory on regime channel.	5
	(b)	Design a regime channel for a discharge of 50 cumecs and silt factor 1.1, using Lacey's theory.	7
	(c)	Find out the normal water depth and velocity in a channel carrying a discharge of 10 cumecs and having bed width 4.5m. Assume Manning's $n=0.0220$ , Bed slope = 0.0020, and Side slope 1.5 (H): 1(V).	8
	(d)	Prove that the shear stress required to move a grain on the bank is less than the shear stress required to move the grain on bed.	5
2	(a)	Define the balancing depth for excavating a channel. Why the balancing depth calculation is necessary?	2+3=5
	(b)	Calculate the balancing depth for a channel section having a bed width 20 m and side slopes of 1(H):1(V) in cutting and 1.5(H):1(V) in filling. The bank embankments are kept 3.0 m higher than the ground level (berm level) and crest width of banks is kept as 2.0 m.	7
	(c)	What is the utility of providing a berm and back berm on either side of canal?	7
	(d)	Define (i) 'Regime Channel', (ii) 'Initial Regime' and (iii) 'True Regime'.	3x2=6
3	(a)	Draw neat sketch to show a typical cross-section of an irrigation canal.	3
	(b)	Explain with neat sketches of different steps of bed formation with the increment of velocity of water in a canal.	12
	(c)	Derive the expression for estimation of 'Average Unit Tractive Force' acts on channel bed. Also show the distribution of 'Tractive Force' generated in a trapezoidal channel section.	3+1=4
	(d)	Write short note on: (i) Borrow pits; (ii) Spoil bank; (iii) River Meandering	3x2=6
4	(a)	How the rivers can be classified on the basis of topography? Explain briefly.	1+4=5
	(b)	How the river flood plain can be classified? Explain briefly.	1+4=5
	(c)	Differentiate between 'bends' and 'meanders' of rivers. Explain the causes of meandering?	2+3=5
	(d)	What are the governing variables for meander process? Explain briefly.	5
	(e)	What are the meander indices? Explain briefly.	5