

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING EXAMINATION 2025

(Second Year, Second Semester, Evening Course)

IRRIGATION ENGINEERING

Time: Three Hours

Full Marks: 100

SL No	<u>Attempt any FOUR questions.</u> <i>Assume suitable values for the parameters if not supplied</i>	Marks
1	(a) Define the balancing depth for excavating a channel.	2
	(b) Why the estimation of balancing depth is necessary?	3
	(c) 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
	(d) What is the utility of providing a berm and back berm on either side of canal?	7
	(e) Please draw a neat sketch, by showing the reason of requirements of Back Berm.	6
2	(a) Compare Kennedy's theory and Lacey's theory on regime channel?	5
	(b) Design a regime channel, for a discharge of 60 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 12 cumecs and having bed width 5m. Assume Manning's $n=0.0225$, 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
3	(a) Discuss briefly the importance of sediment transport study of a canal.	2
	(b) What are different types of sediment load? Discuss briefly. What is 'Threshold of motion'?	3+1= 4
	(c) Show the curve for 'Shield's Entrainment Function' vs. 'Particle Reynolds Number' for laminar flow of bed through turbulent movement of bed, and then prove that, $d = 11RS$ for channels in coarse alluvium.	3+3= 6
	(d) Explain Lacey's theory for regime channel. Also explain true regime, initial regime and final regime.	
	(e) Derive the expression for 'Average Unit Tractive' force for a canal. Show the diagram for the distribution of tractive force generated in a trapezoidal channel section.	2+3x2= 8 3+2= 5
4	(a) What is called river 'Bend' and 'River Meandering'? Explain their difference briefly with sketches	5
	(b) Explain the causes of meandering.	5
	(c) What type of river training work structure may be provided to avoid the meandering and explain its working principle.	7
	(d) Explain the meander indices and formation of Oxbow Lake.	6+2= 8
5	(a) Define Duty, Delta, and Crop Period. Derive the correlation between Duty and Delta.	2x2+3= 7
	(b) Define Flow Duty and Quantity Duty. Explain the factors on which Duty depends. Explain the importance of Duty. Write down the measures to improve Duty.	2+3+3+5= 13
	(c) Explain irrigation Efficiency and its categories. .	5