

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING EXAMINATION 2024*(Third Year, First Semester, Old Syllabus)***IRRIGATION ENGINEERING**

Time: Three Hours

Full Marks 100

No. of questions	Attempt All Questions <i>Assume suitable values for the parameters if not supplied.</i>	Marks
1	(a) Draw neat sketches and discuss about the canal bed formation at different conditions of canal flow.	12
	(b) Find out the normal water depth and velocity in a channel carrying a discharge of 15 cumecs and having bed width 4.5m. Assume Manning's $n=0.0220$, Bed slope = 0.0020, and Side slope 2(H): 1(V).	8
	(c) Compare Kennedy's theory and Lacey's theory on regime channel.	5
2	(a) Define the balancing depth for excavating a channel. Why the balancing depth calculation is necessary?	2+3=5
	(b) Draw neat sketch to show a typical cross-section of an irrigation canal.	3
	(c) What is the utility of providing a berm and back berm on either side of canal? Discuss with neat sketches.	7
	(d) Derive the expression for estimation of 'Average Unit Tractive Force' acts on channel bed.	3
	(e) Calculate the balancing depth for a channel section having a bed width 15 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
3	(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
4	(a) Design a regime channel for a discharge of 50 cumecs and silt factor 1.1, using Lacey's theory	7
	(b) 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.	6
	(c) A canal is to be designed to carry a discharge of 65 cumecs. The slope of the canal is 1 in 1500. The soil is coarse alluvium having a grain size of 5cm. Assuming the canal to be unlined and a trapezoidal section with free board 0.5m on top of the flow surface level, determine a suitable section for the canal, the angle of shearing resistance may be taken as 37° . Also provide a schematic diagram for the canal section	9
	(d) Explain the difference between the internal borrow pit and the external borrow pit.	3