

**BACHELOR OF ENGINEERING IN CIVIL ENGINEERING EXAMINATION 2023**  
(Second Year, Evening, Second Semester)

**IRRIGATION ENGINEERING**

Time: Three Hours

Full Marks: 100

SL No	Answer any FIVE questions. Assume suitable values for the parameters if not supplied	Marks
1	(a) Explain with neat sketches of different steps of bed formation with the increment of velocity of water in a canal. (b) 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. (c) Write short note on: (i) Borrow pits; (ii) Spoil bank;	12 3+1=4 2x2=4
2	(a) What is called river 'Bend' and 'River Meandering'? (b) Explain the causes of meandering. (c) What type of river training work structure may be provided to avoid the meandering and explain its working principle. (d) Explain the meander indices.	2 3 7 8
3	(a) Discuss briefly the importance of sediment transport study of a canal. (b) Discuss briefly about different types of sediment load. What is 'Threshold of motion'? (c) Show the curve for 'Shield's Entrainment Function' vs. 'Particle Reynold's Number' for laminar flow of bed through turbulent movement of bed. (d) Prove that $d = 11RS$ for channels in coarse alluvium. (e) Explain the Initial theory for regime and its modification. Also explain true regime, initial regime and final regime.	2 3+1=4 3 3 2+3x2=8
4	(a) When a land said to be water-logged area? (b) What are the ill effects of water-logging? Explain briefly. (c) Explain the causes and remedial measures for water-logging.	2 3 15
5	(a) Prove that the shear stress required moving a grain on the bank is less than the shear stress required to move the grain on bed. Estimate the ratio of Tractive Force at Bed and Bank, having 2H:1V inclination and $30.50^\circ$ angle of repose. (c) Design and draw the neat sketch with designed dimension of an irrigation canal for a discharge of 62 cumecs adopting the available ground slope of $1.7 \times 10^{-4}$ . The canal bed material has a median size of 1.95 mm. Also recommend the size of coarser material to be excluded from the canal for its efficient functioning.	10 10
6	(a) What is called braided river? What are the probable reason for developing the braided river? (b) Explain the precondition of developing cut-off. (c) A river cross section was initially axisymmetric, but with time the same became in-axisymmetric. Explain the reason.	2+3=5 7 8