Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023

Subject Code:3160618 Date:13-12-2023

Subject Name: Open Channel flow

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Classify the flows in channel.	**03**
	(b)	Derive the expressions for critical depth in channels of circular sections.	**04**
	(c)	Draw definition sketch for energy equation.	**07**
Q.2	**(a)**	Explain the subcritical flow in channel with sketch.	**03**
	(b)	Obtain the value of first hydraulic exponent (M) for the rectangular and triangular channels.	**04**
	(c)	Show that in triangular channel the froude number corresponding to alternate depth are given by $F1/F2 = (4+F_2^2)^{5/2} / (4+ F_2^2)^{5/2}$	**07**
		OR	
	(c)	Find the critical depth for a specific energy head of 1.5 m in the following channels: (a) Rectangular channel, B = 2.0 m, (b) Triangular channel , B = 1.5 m (c) Trapezoidal channel, B = 2.0 m and m = 1.0 m	**07**
Q.3	**(a)**	Define (1) Critical depth (2) Section factor (3) Froude Number	**03**
	(b)	Which are the factors affecting on ‘n’- Mannings coefficient?	**04**
	(c)	Explain velocity distribution for turbulant flow in channel.	**07**
		OR	
Q.3	**(a)**	Explain in detail ‘S’ type flow profile.	**03**
	(b)	Write short note on ‘Transitional Depth’.	**04**
	(c)	What is the role of end condition in the open flow channel?	**07**
Q.4	**(a)**	Which are the different simple numerical solutions of GVF problem.	**03**

	(b)	Describe the classifications of hydraulic jump.	**04**
	(c)	Short note on: Standing wave Flume.	**07**

OR

Q.4	**(a)**	Explain in brief Lacey's regime theory.	**03**
	(b)	Explain concept of shield's analysis for uniform flow in mobile Boundary channels.	**04**
	(c)	Derive the equation for energy loss in hydraulic jump.	**07**
Q.5	**(a)**	What are the limitations of Kennedy's theory?	**03**
	(b)	Discuss positive surge and negative surge.	**04**
	(c)	Derive the equation of motion for Gradually Varied Unsteady Flow (GVUF) in a prismatic channel.	**07**

OR

Q.5	**(a)**	Define spatically varied flow	**03**
	(b)	Describe the characteristics of flow over spillway.	**04**
	(c)	A standard lined trapezoidal canal section is to be designed to convey 100 m^3/s of flow. The side slopes are to be 1.5 horizontal: 1 vertical and Manning's n = 0.016. The longitudinal slope of the bed is 1 in 5000. If a bed width of 10.0 m is preferred what would be the normal depth?	**07**

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