Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 711201N **Date: 08-01-2013**

Subject Name: Advanced Fluid Mechanics

Time: 02.30 pm – 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.**

Q.1	**(a)**	Explain briefly the classification of open channel flows	**07**
	(b)	Explain significant of each term of Navier-stokes equation	**07**
Q.2	**(a)**	What is the standard step method for computing GVF profiles explain briefly?	**07**
	(b)	A discharge of 16.0 cubic meter/sec flows with a depth of 2.0 meter in a rectangular channel 4.0 meter wide. At a downstream section the width is reduced to 3.5 meter and the channel bed is raised by Z. Analyse the water surface elevations in the transitions when Z = 0.4 meter. **OR**	**07**
	(b)	A trapezoidal channel is 10.0 meter wide and has a side slope of 1.5 horizontal: 1 vertical. The bed slope is 0.0003.The channel is lined with smooth concrete of n = 0.012. Compute the mean velocity and discharge for a depth of flow of 3.0 meter.	**07**
Q.3	**(a)**	Sketch the possible GVF profiles in the following serial arrangement of channels. (I) steep-mild-steep (ii) mild-steep-mild (iii) mild-sluice gate-mild-drop.	**07**
	(b)	A trapezoidal channel has a bed width B = 5.0 meter, bed slope = 0.0004, side slope m = 2 horizontal : 1 vertical and n = 0.002. The normal depth of flow is 3.0 meter and critical depth of flow is 1.69 meter. If the channel empties into a pool at the downstream end and the pool elevation is 1.25 meter higher than the canal bed elevation at the downstream end, calculate and plot the resulting GVF profile for depth 1.69,1.80,2.00,2.20,2.40,2.65,2.80,2.90,2.94 and 2.96 meter by direct step method.	**07**
		OR	
Q.3	**(a)**	Derive differential equation of SVF with increasing discharge.	**07**
	(b)	Explain uniformly progressive wave	**07**
Q.4	**(a)**	Derive the sequent depth ratio and energy loss for the hydraulic jump in a rectangular section.	**07**
	(b)	A rectangular channel carrying a supercritical stream is to be provided with a hydraulic-jump type of energy dissipater. If it is desired to have an energy loss of 5.0 meter in the jump when the inlet Froude number is 8.5 determine the sequent depths.	**07**
		OR	
Q.4	**(a)**	What are the different methods of preventing boundary layer flow	**07**
	(b)	Give the detailed classification of rapidly varied unsteady flow.	**07**
Q.5	**(a)**	Explain briefly different types of bed forms.	**07**
	(b)	Define the term (I) sediment load (ii) bed load (iii) suspended load.	**07**
		OR	
Q.5	**(a)**	Write a short note on hydraulically smooth and rough pipes.	**07**
	(b)	Explain Prandtl's mixing length theory.	**07**

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