

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- VI (NEW) EXAMINATION – WINTER 2021****Subject Code:3160618****Date:04/12/2021****Subject Name:Open Channel flow****Time:10:30 AM TO 01:00 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) Define gradually varied and rapidly varied flow. **03**
- (b) What is surge in fluid? What is the difference between positive surge and negative surge? **04**
- (c) Draw definition sketch for energy equation **07**
- Q.2** (a) Explain with sketch: critical depth. **03**
- (b) Write about subcritical flow in a width construction, transition width a change in width. **04**
- (c) Show that in triangular channel the froude number corresponding to alternate depth are given by $F_1/F_2 = (4+F_2^2)^{5/2} / (4+F_1^2)^{5/2}$ **07**

OR

- (c) In rectangular channel F_1 and F_2 are froude nos. Corresponding to the alternative depth of variation discharge show that $(F_2/F_1)^{2/3} = (2+f_2^2) / (2+F_1^2)$ **07**
- Q.3** (a) What is open channel? Why bed slope is provided in open channel? Explain various types of open cahnnels with sketch. **03**
- (b) Explain different types of shear theories for turbulent flow. **04**
- (c) Find the width and depth of a rectangular channel to convey a discharge of 1.5 m³/s at a velocity of 0.5 m/s. Take Chezy's constant equal to 60 and the bed slope equal to 0.00012. **07**

OR

- Q.3** (a) Write advantages and disadvantages of shear theories. **03**
- (b) Explain various types of open cahnnels with sketch. **04**
- (c) A concrete lined trapezoidal channel has to discharge 600 cumecs. The side slopes are 1 in 1 and the bed slope is 1 in 4000. The permissible velocity is 2.5 m/s. Determine the bottom **07**

width and depth of the channel. Take Manning's $N=0.014$.

- Q.4** (a) What is Hydraulic jump? How it is formed? **03**
- (b) Explain about mobile boundary channels. **04**
- (c) Derive differentiate equation of gradually varied flow with assumptions made in it. **07**

OR

- Q.4** (a) Write the the different end conditions on the flow in Gradually-varied flow and explain any one case. **03**
- (b) Obtain the value of N for (a) a wide rectangular channel and (b) a triangular channel. **04**
- (c) Draw M_1 , M_2 , and M_3 type surface profiles using basic equatior gradually varied flow. **07**
- Q.5** (a) Write about sharp crested weir. **03**
- (b) Explain contractions on the Spillway. **04**
- (c) Derive the equation for uniformly progressive wave. **07**

OR

- Q.5** (a) What are the limitations of Kennedy's theory? **03**
- (b) Explain in brief Lacey's regime theory. **04**
- (c) Write short note on: Shield's diagram. **07**
