

Total number of printed pages-3

53 (CE 714) OCEFL

2019

OPEN CHANNEL FLOW

Paper : CE 714

Full Marks : 100

Time : Three hours

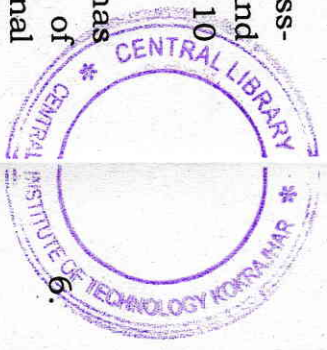
The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. Write short notes on : 5×4=20
 - (a) Types of channels
 - (b) Classification of open-channel flow
 - (c) Types of hydraulic jump
 - (d) Classification of flow profiles.

Contd.

2. (a) Identify and sketch the GVF profiles in three mild slopes which could be described as mild, steeper mild and milder. The three slopes are in series. The last slope has a sluice gate in the middle of the reach and the downstream end of the channel has a free overfall. 10
- (b) The velocity distribution in a rectangular channel of width B and depth of flow y_0 was approximated as $v = k_1 \sqrt{y}$ in which k_1 is constant. Calculate average velocity for the cross-section and correction coefficients α and β . 10
3. (a) A 3.0m wide rectangular channel has a flow of $3.6m^3/s$ with a velocity of $0.9m/s$. If a sudden release of additional flow at the upstream end of the channel causes the depth to rise by 50%, determine the absolute velocity of the resulting surge and the net flow rate. 10
- (b) Derive the momentum equation of St. Venant Equation. 10



4. (a) Derive the differential equation of gradually varied flow. 10
- (b) Explain the depth of flow for the channel transitions (a) with hump (b) with increased width of channel. 10
5. (a) Calculate the bottom width of a channel with discharge of $15m^3/s$ and critical depth of $1.2m$. (a) Rectangular (b) Trapezoidal, $m = 1.5$. 10
- (b) A 2.5m wide rectangular channel has a specific energy of $1.5m$ and discharge of $6.48m^3/s$. Calculate alternate depth and corresponding Froude Numbers. 10
6. For hydraulic jump in rectangular channel, derive the equation for sequent depth ratio and energy loss. 20