Total number of printed pages:2 **Programme PG/Semester 1st /Paper Code PCEW102**

2022

Open Channel Flow

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1.	a)	Explain the phenomenon of the depth of flow for the channel transitions a) with hump and b) with increase in channel width.	10
	b)	A rectangular channel has a width of 2.0 m and carriers a discharge of 4.80 m3/s with a depth of 1.60 m. at a certain section a small, smooth hump with a flat top and of height 0.10 m is proposed to be built. Calculate the likely change in the water surface. Estimate the minimum size of the hump to cause critical flow over the hump.	10
2	a)	For hydraulic jump in rectangular channel derive the equation for sequent depth ratio and energy loss.	10
	b)	Derive the differential equation of gradually varied flow.	10
3	a)	A horizontal trapezoidal channel of 2.0-m bed width and side slopes 2 horizontal: 1 vertical carries a discharge of 6.225 m3/s at a depth of 0.20 m. If a hydraulic jump takes place in this channel, calculate the sequent depth and energy loss.	10
	b)	Find the slope of the free water surface in a rectangular channel of width 20m, having depth of flow 5m. The discharge through the channel is 50 m3/s. The bed of the channel is having a slope of 1 in 4000. Take the value of Chezy's constant C=60.	10
4		Write Short Notes On: a) Hydraulic Jump b) Flow Profiles of GVF c) Surges d) Slopes of GVF e) Types of open channel	5 x 4 =20
5		Sketch the possible GVF profiles in the following serial arrangement of channels and control. The flow is from left to right:	4 x 5 =20

		a) mild – sluice gate – steep – horizontal – sudden drop (b) steep – steeper–mild – milder slope (c) steep – mild – sluice gate – mild – sudden drop (d) sluice gate – adverse – horizontal – steep slope	
6	a)	A rectangular channel carries a flow with a velocity of 0.65 m/s and depth of 1.40 m. If the discharge is abruptly increased twice by a sudden lifting of a gate on the upstream, estimate the velocity and the height of the resulting surge.	10
	b)	In a tidal river the depth and velocity of flow are 0.9 m and 1.25 m/s respectively. Due to tidal action a tidal bore of height 1.2 m is observed to travel upstream. Estimate the height and speed of the bore and the speed of flow after the passage of the bore.	10