

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: BTECH
BRANCH: CIVIL

SEMESTER : VII
SESSION : MO/2024

SUBJECT: CE416 OPEN CHANNEL FLOW

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

		CO	BL
Q.1(a)	State if the following flows are steady/unsteady and uniform/nonuniform: (a) River flow around a bridge pier (b) Flow in a long prismatic irrigation channel (c) Flow down a dam (d) Receding flood flow	[2] 1	3
Q.1(b)	Discuss a method to measure discharge in a wide river.	[3] 1	1
Q.2(a)	Derive the resistance equation for channel flow.	[2] 1	2
Q.2(b)	A steep rectangular channel has a slope of 30° with the horizontal. At a section the bed is 1.20 m above the datum, the depth of flow is 0.70 m and the discharge is $3.10 \text{ m}^3/\text{s}$ per metre width. Calculate the total energy head at that section by assuming $\alpha = 1.10$.	[3] 2	4
Q.3(a)	Show that at the critical state of flow the specific-energy head in a rectangular channel is equal to 1.5 times the depth of flow, assuming zero slope and $\alpha = 1$.	[2] 2	3
Q.3(b)	The velocity distribution in a very wide river 4.0 m deep is found to vary approximately in accordance with the equation $u = 0.5 + 2(y/h)^{1/2}$. Calculate α .	[3] 2	4
Q.4(a)	An open channel of symmetric right-angled triangular cross-section is conveying a discharge Q . what is the critical depth?	[2] 2	3
Q.4(b)	A rectangular channel with a slope of 0.0064 is to carry 20 cumecs of water. Determine the width of the channel if the flow is in critical condition. $N=0.015$	[3] 2	4
Q.5	In a rectangular channel 3.5 m wide laid at a slope of 0.0036, uniform flow occurs at a depth of 2 m. Find how high can the hump be raised without causing afflux? If the upstream depth of flow is to be raised to 2.5 m, what should be the height of the hump? Take Manning's n equal to 0.015.	[5] 2	4

:19/09/2024:M