BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH   SEMESTER : VII
BRANCH: CIVIL   SESSION : MO/2024

SUBJECT: CE416 OPEN CHANNEL FLOW

TIME: 3 Hours   **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

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Q.1(a) Give examples of (a) Subcritical laminar flow and supercritical turbulent flow.   [4]   1   3
        (b) Prismatic rigid channel and non-prismatic alluvial channel.

Q.1(b) A circular sewer pipe laid on a slope of 1:2500 is to carry 1.5 cumecs of water.   [6]   2   4
        Determine the size of the pipe if the pipe has to flow half full. N=0.015.

Q.2(a) With the help of neat diagrams, show alternate depths and conjugate depths.   [4]   2   2

Q.2(b) The velocity distribution in a wide river 2 m deep is found to vary as u = (0.5+y/h),   [6]   3   5
        in which h is the depth of flow and u is the velocity at any distance y from the
        bottom of the river.   Find the kinetic   energy correction and the
        momentum correction factors.

Q.3(a) Draw all the surface profiles formed when a critical slope meets a mild slope which   [4]   3   4
        then meets a drop.

Q.3(b) A flume 3.0 m wide carries a discharge of 4.0 m^3/s. The bed slope is 0.005 and at   [6]   3   5
        the section the flow depth is 1.2 m. Calculate the distance of the section
        downstream where the flow depth is 0.80 m. Assume N=0.014.

Q.4(a) Write three uses of hydraulic jumps.   [3]   4   3

Q.4(b) A trapezoidal channel having bottom width 6m, side slope 2:1 carries a discharge   [7]   4   6
        of 12 m^3/s. Compute the backwater profile created by a dam which backs up water
        to a depth of 4 m immediately behind the dam. (N=0.025, S_o =0.0016)

Q.5(a) Derive St. Venant's equation for unsteady flow in a channel.   [5]   5   3

Q.5(b) What is hydrologic routing? Describe Muskingum method for river routing.   [5]   5   3

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