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

CLASS: BE **SEMESTER: V**
BRANCH: CIVIL **SESSION : MO/2018**

SUBJECT : CE5003 FLUID MECHANICS II

TIME: 1.5 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1 (a) What is the difference between open channel flow and pipe flow? [2]
(b) The velocity distribution along a vertical in a channel can be expressed as $v/v_{max} = (y/y_0)^{1/2}$ where y_0 = depth of flow, and v = velocity at any height y above the bed. Find the values of energy correction factors α and β. [3]

Q2 (a) What are the geometrical parameters of a channel? [2]
(b) Derive the continuity equation for steady and unsteady flow in an open channel. [3]

Q3 (a) Derive Chezy's equation for uniform flow in open channel. [2]
(b) A triangular channel with an apex angle of 75^o carries a flow of 1.2 m^3/s at a depth of 0.8 m. If the bed slope is 0.009, find the roughness coefficient of the channel. [3]

Q4 (a) A 5.0 m wide trapezoidal channel having a side slope of 1.5 horizontal: 1 vertical is laid on a slope of 0.00035. The roughness coefficient n = 0.015. Find the normal depth for a discharge of 20 m^3/s through this channel. [2]
(b) A standard lined trapezoidal canal section is to be designed to convey 100 m^3/s of flow. The side slopes are to be 1.5 horizontal: 1 vertical and Manning's n = 0.016. The longitudinal slope of the bed is 1 in 5000. If a bed width of 10 m is preferred what would be the normal depth? [3]

Q5 (a) What is specific energy? Derive expression of critical flow depth, critical velocity and minimum specific energy for a rectangular channel. [2]
(b) Calculate the critical depth and the corresponding specific energy for a discharge of 5 m^3/s in a trapezoidal channel of 2 m width and side slopes 1.5:1. [3]

Q6 (a) Derive expression of specific force for a smooth horizontal rectangular channel. [2]
(b) A flow of 5 m^3/s is passing at a depth of 1.5 m through a rectangular channel of 2.5 m width. The kinetic energy correction factor α is found to be 1.2. What is the specific energy of the flow? What is the value of the depth alternate to the existing depth if α = 1.0 is assumed for the alternate flow? [3]

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