Govt. College of Engineering, Amravati

Class test 1 Sub:(CEU405) Open Channel flow & Hydraulic Machines Max. Mark =15 Time : 1 hour

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Solve any three questions

Q.1 a What is specific energy? Derive the equation for critical depth.(2)

b. A trapezoidal channel with side slopes of 1 in 1 has to be designed to convey 10 m^3/s at a velocity of 2 m/s so that the amount of concrete lining for the bed and sides is the minimum. Calculate the area of lining required for one meter length of canal. (3)

Q.2 a Explain the terms: (i) Rapidly varied flow and (ii) Gradually varied flow (2)

b. A discharge of 2000 m^3/s is to pass over a rectangular weir. The weir is divided into number of openings each of span 10 m. If the velocity of approach is 4 m/s, find the number of openings needed in order the head of water over the crest is not to exceed 2 m. (3)

Q.3aWhat is Broad crested weir? Find the condition for maximum discharge over Broad crested weir (2)

b. Find the slope of the free water surface in a rectangular channel of width 20 m, having depth of flow 5 m. The discharge through the channel is 50 m^3/s. The bed of the channel is having slope of 1 in 4000. Take the value of Chezys constant C= 60. (3)

Q.4 a Explain the various surface profiles of Gradually varied flow. (2)

b. Derive an expression for sequent depths of hydraulic jump. (3)

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Class test –I Subject : Open channel flow and Hydraulic Machines Max. Marks 15

Solve any three questions

Q.1 a. Define and explain

i) Afflux and Back water curve

ii) Rapidly varied flow and Gradually varied flow (2)

b. A trapezoidal channel has side slopes of 3 horizontal to 4 vertical and slope of its bed is 1 in 2000. Determine the optimum dimensions of channel, if it carry water at 0.5 m^3/s. Take Chezy's constant as 80. (3)

Q.2 a. What is specific energy ? Derive expression for critical depth and critical velocity.(2)

b. A sluice gate discharges water into a horizontal rectangular channel with a velocity of 6 m/s and depth of flow of 0.4 m. The width of channel is 8 m. Determine whether a hydraulic jump will occur , and if so, find the height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump. (3)

Q.3a. In 1 in 20 model of stilling basin, the height of the hydraulic jump in the model is observed to be 0.2 m. What is the height of the hydraulic jump in the prototype? If the energy dissipated in the model is 1/10 kW, what is corresponding value in prototype? (2)

b. Derive the expression for the Gradually varied flow (3)

Q.4 a. Differentiate between distorted and undistorted model? (2)

b..Water is flowing through a pipe of diameter 30 cm at a velocity of 4 m/s . Find the velocity of oil flowing in another pipe of diameter 10 cm, if the condition of dynamic similarity is satisfied between the two pipes. The viscosity water and oil is given as 0.01 poise and 0.025 poise. The sp. Gr. Of oil =0.8 (3)

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Class test –I Subject : Open channel flow and Hydraulic Machines Max. Marks 15

Solve any three questions

Q.1 a. Derive the conditions for most economical rectangular channel. (2)

b. A trapezoidal channel has side slopes of 3 horizontal to 4 vertical and slope of its bed is 1 in 2000. Determine the optimum dimensions of channel, if it carry water at 0.5 m^3/s. Take Chezy's constant as 80. (3)

Q.2 a. Define and explain the Cippolletti weir. (2)

b. Find the discharge through a trapezoidal notch which is 1 m wide at the top and 0.40 m at the bottom and is 30 cm in height. The head of water on the notch is 20 cm. Assume C_d for rectangular portion =0.62 while for triangular portion =0.60. (3)

Q.3 a. What is specific energy ? Derive expression for maximum discharge for given value of sp. energy.(2)

b. A sluice gate discharges water into a horizontal rectangular channel with a velocity of 6 m/s and depth of flow of 0.4 m. The width of channel is 8 m. Determine whether a hydraulic jump will occur , and if so, find the height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump. (3)

Q.3a. In 1 in 20 model of stilling basin, the height of the hydraulic jump in the model is observed to be 0.2 m. What is the height of the hydraulic jump in the prototype? If the energy dissipated in the model is 1/10 kW, what is corresponding value in prototype? (2)

b. Derive the expression for the Gradually varied flow (3)

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