Exam.Code:0945
Sub. Code: 7106

1078
B.E. (Civil Engineering)
Third Semester
CIV-306: Fluid Mechanics – II

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.*

x-x-x

I. Attempt the following:-

a) Classify uniform flow in open channels. Also give examples of such flows.

b) Explain the features of a broad-crested weir.

c) What are the disadvantages of outward flow turbine?

d) Define and compare the conveyance depth and normal depth.

e) Give the working mechanism of Pelton wheel turbine. (5x2)

UNIT – I

II. a) Find the width and depth of a rectangular channel to convey a discharge of 1.45 cumecs at a velocity of 0.5 m/s. The bed of the channel has a slope of 0.0001.

b) What do you mean by a channel of best section or most economical channel section? (5,5)

III. a) Calculate the critical depth corresponding to a discharge of 7.5 cumec for (i) Rectangular channel of width 3 m, and (ii) trapezoidal channel of bottom width 2 m and side slopes 1V:1.25H.

b) What is hydraulic jump? How is its location computed? (6,4)

IV. a) Water is flowing uniformly in a rectangular open channel with unfinished concrete surfaces (Manning's n = 0.014). The channel width is 8 m, the flow depth is 3 m, and the bottom slope is 0.004. Determine if the channel should be classified as mild, critical, or steep for this flow.

b) A rectangular channel 6 m wide has a bed slope of 1 in 2000 and under original conditions the depth is 1 m. A dam was placed across the channel, increasing the depth at the dam to 1.4 m. Calculate the depth of flow at 150 m upstream of the dam, assuming that flow remains unchanged and C in Chezy's formula remains constant at 60. (4,6)

P.T.O.

UNIT – II

V. a) A flat plate 1 m x 1 m moves through air of density 1.15 kg/m at 36 km/h. Determine the (i) drag force, and (ii) lift force, and (.iii) resultant force.

b) What is Magnus effect? How does it affect lift? (5,5)

VI. a) Derive an equation for computing force of a fluid jet of velocity V directly impacting on a moving plate with velocity U in the same direction. Take $U < V$.

b) A jet of water 250 mm diameter impinges normally on a flat plate moving at 2 meters per second in the same direction as that of the jet. If the discharge is 0.490 cumec, find the force exerted by the jet on the plate. Find also the work done on the plate per second. (6,4)

VII. A centrifugal pump is provided at a height of 4 m above the sump water level and the outlet of the delivery pipe is 9 m above the sump water level. The vane angle at the outlet is 50°. The velocity of flow through the impeller is constant at 1.5 m/s. Find (i) the pressure head at inlet to the wheel, and (ii) the pressure head at the outlet of the wheel. Assume that the velocity of water in the pipes is equal to the velocity of flow through the impeller. Ignore the losses. (10)

x-x-x