Roll No. [_____] Total No. of Pages : 2

Total No. of Questions : 09

B.Tech.(CE) (Sem.–4)
Fluid Mechanics-II
Subject Code : CE-204
Paper ID : [A0607]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Write briefly :

a. Explain in brief the variation of velocity in a channel section.

b. What are the necessary conditions for the formation of hydraulic jump in rectangular channel of constant width?

c. Classify the various kinds of channel bottom slopes.

d. What are the characteristics of turbulent flow?

e. Explain what causes drag on immersed bodies?

f. What is the significance of Froude Number?

g. Define gradually varied flow.

h. What is the significance of channels of most efficient section?

i. Draw specific energy diagram.

j. What are the various empirical relations suggested for Chezy coefficient?

SECTION-B

2. How do you describe positive surge due to (i) sudden increase of flow, and (ii) sudden reduction of flow in an open channel.   (5)

3. Describe with reference to flow over a flat plate the formation of boundary layer.   (5)

4. What are the characteristics of surface profiles? How do you determine the characteristics of different profiles in case of (i) Mild sloped channels, and (ii) Critical sloped channels?   (2.5+2.5)

5. A rectangular channel carries discharge of 2 cumecs per meter width. If the loss of energy in the hydraulic jump is found to be 2.75 m, determine the conjugate depths before and after the jump.   (5)

6. For a constant specific energy of 1.8N.m/N, calculate the maximum discharge that may occur in a rectangular channel 5 m wide.   (5)

SECTION-C

7. Distinguish between deformation drag, surface drag and form drag. Draw and explain the approximate flow pattern and pressure distribution around a cylinder.   (10)

8. A most efficient trapezoidal channel is required to give a maximum discharge of 21.5 cumecs of water. The slope of the channel bottom is 1 in 2500. Taking $C = 70$ m$^{1/2}$/s in Chezy equation, determine the dimensions of the channel. Also determine the value of Manning's n taking the value of velocity of flow as obtained for the channel by Chezy's equation.   (10)

9. Laminar flow of a fluid of viscosity 0.9Kg/ms and mass density 1250Kg/m^3 occurs between a pair of plates of extensive width, the plates are 10 mm apart and are inclined at 45 degree to the horizontal. Pressure gauges mounted at two points 1.2 m vertically apart on the upper plate record pressures of 75 kN/m^2 and 250 kN/m^2. The upper plate moves with a velocity of 2 m/s relative to the lower plate but in a direction opposite to the fluid flow. Make calculations for (a) the velocity and shear stress distribution between the plates, (b) the maximum flow velocity, and (c) the shear stress on the upper plate.   (10)