Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CE) (2011 onwards) (Sem.–4)

FLUID MECHANICS-II

Subject Code : BTCE-404

Paper ID : [A1174]

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 have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a. What is Sequent depth?

b. What is Critical Reynolds Number?

c. What is Resistance diagram?

d. Explain the Mach number.

e. What do you mean by Boundary Layer Thickness?

f. Define the term Average Friction Coefficients.

g. Distinguish between uniform and Non-Uniform Flows.

h. Explain the term Hydraulic jump.

i. Explain the Momentum Principle.

j. What is negative Surge?

SECTION-B

2. Derive a relation between Shear and Pressure gradient in laminar flow.

3. A discharge of $16m^3/s$ flows with a depth of 2 m in a rectangular channel 4m wide. At a downstream section, width is reduced to 3.5 m and channel bed is raised by 0.35 m. Analyze water surface elevation in the transition.

4. Explain the concept of propagation of elastic waves due to disturbance in fluid.

5. Explain stagnation pressure concept in compressible flows.

6. Derive an expression for Energy equation used in compressible fluid flow system.

SECTION-C

7. A channel has vertical walls 1.2 m apart and a semi-circular invert. If the centre line depth is 0.9 m and bed slope is 1 in 2500, find the discharge using Chezy's formula with $c = 54$

8. Water flows at 20 degree C through a smooth pipe of diameter 300mm at the rate of 300 liters per sec. determine the value of radius at which the local velocity is equal to the average velocity of flow in the pipe. Also, determine the maximum velocity of flow.

9. Oil of viscosity 0.1 Pascal-sec and specific gravity 0.90, flows through a horizontal pipe of 25 mm diameter. If the pressure drop per metre length of pipe is 12 kPa, determine

   (i) Rate of flow in N/min

   (ii) Shear stress at pipe wall

   (iii) Reynold number of flow

   (iv) Power required per 50 in length of pipe to maintain the flow