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Total No. of Questions : 09

B.Tech. (IE/ME) (Sem.–4) (2008 Batch)

FLUID MECHANICS-I

Subject Code : ME-206

Paper ID : [A0810]

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.
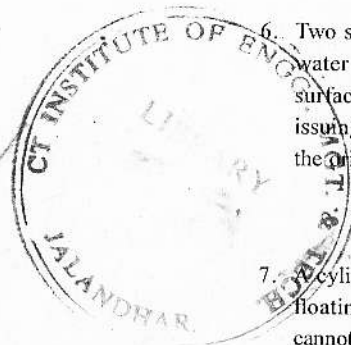
SECTION-A

I. **Answer briefly :**

a. Define viscosity and derive the units and dimensions of viscosity.

b. How do you determine the fluid pressure and its location on a submerged horizontal surface?

c. *"The liquid mass in a container subjected to constant horizontal acceleration is equivalent to a liquid mass at rest"*. Discuss.

d. What are the various methods of describing fluid flow pattern?

e. What is kinetic energy correction and what is its significance?

f. Explain Reynolds model law.

g. What are the different types of similarities that must exist between model and prototype?

h. What are minor head losses in pipes?

i. Explain vortex motion.

j. Differentiate venturimeter and orificemeter.

SECTION-B

2. Calculate the capillary effects in a glass tube immersed in water at 20°C. Given: Surfa 20°C = 0.0735 N/m. and contact angle = 0°. to be used in the calculation.

3. If stream function, $\psi = (x^3 - 3xy^2)$, indicate wh or irrotational. If flow is irrotational, determine t

4. The velocity distribution in a pipe is given by the

   m/s, where u is the velocity at any radius r <R, diameter of pipe is 250 mm, calculate average v

5. A pump is used to lift an oil of specific gravit the suction and discharge sides of the pump gauges are : -0.25 m of mercury and 140 k suction gauge is placed 600 mm below the cen the gauge on the discharge side is placed 170 m diameters of pipes on the suction and disch 100 mm respectively and the quantity of oil to second, calculate power supplied by the pump. pump as 70%.

6. Two small identical orifices are located at the water depth H. One orifice is located at a dep surface and the other h above the tank bottom issuing from the orifices will strike the ground the orifice. Also, find this distance.

SECTION-C

7. A cylindrical buoy 2 m diameter, 2.5 m high a floating in sea water (specific weight = 10 kN/ cannot float with its axis vertical. What minimum a chain attached to the center of base to keep th

8. Three pipes 300 m length of 300 mm diameter, 150 m length of 200 mm diameter and 200 m length of 250 mm diameter, respectively are fitted between two reservoirs in series. The friction factors for these pipes are 0.019, 0.021 and 0.020, respectively. Determine discharge if difference in water surface elevations between the two reservoirs is 10 m. The value of loss coefficient of contraction may be taken as 0.275. Also, draw HGL and TEL.

9. The pressure drop Δp due to an obstruction in a pipe depends on pipe diameter D, average velocity of flow V, mass density ρ, viscosity μ of the flowing fluid and characteristic dimension of obstruction d. Determine a set of dimensionless parameters using Buckingham method of analysis.

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