R18

Code No: 154AZ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, November/December - 2020
FLUID MECHANICS AND HYDRAULIC MACHINES
(Mechanical Engineering)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

1.a) What is the difference between the dynamic viscosity and kinematic viscosity? State their units of measurements.
b) A soap bubble 51 mm in diameter has an internal pressure in excess of outside pressure of 0.00021 kg(f)/cm^2. Calculate the surface tension in the soap film. [8+7]

2.a) Prove that the pressure is the same in all directions at a point in a static fluid.
b) An inverted differential manometer containing an oil of specific gravity 0.9 is connected to find the difference of pressures at two points of a pipe containing water. If the manometer reading is 40 cm, find the difference of pressures. [8+7]

3. Define the equation of continuity. Obtain an expression for continuity equation for three dimensional flow. [15]

4.a) State the Bernoulli's theorem. Mention the assumptions made. List out the Engineering applications.
b) Show that in case of forced vertex flow, the rise of liquid level at the ends is equal to fall of liquid level at axis of the rotation. [8+7]

5. Determine the rate of flow of water through a pipe of diameter 20 cm and length of 50 m when one end of pipe is connected to a tank and other end of pipe is open to the atmosphere. The pipe is horizontal and height of water in the tank is 4 m above the centre of the pipe. Consider all minor losses and take f= 0.009. [15]

6. Find the displacement thickness, energy thickness and momentum thickness for the velocity distribution in the boundary layer given by $\frac{u}{U}=\frac{y}{\delta}$, where u is the velocity at distance y from the plate and u=U at y= δ, where δ= boundary layer thickness. Also calculate the value of δ*/Θ. [15]

7. What is draft tube? Describe with sketch two different types of draft tubes. Why it is used in reaction turbine. [15]

8.a) Explain the working principles of reciprocating pump with a neat sketch.
b) A single acting reciprocating pump, running at 50 r.p.m. deliver 0.01 m^3/s of the water. The diameter of the piston is 200 mm and stoke length 400 mm. Determine i) the Theoretical discharge of the pump ii) Coefficient of the discharge and iii) slip and percentage of the slip. [8+7]

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