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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(AE) (2011 onwards) (Sem.-4)
FLUID MECHANICS AND MACHINERY
Subject Code : BTAE-403
Paper ID : [A1163]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS 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**Q1. Write briefly :**

- a) Differentiate between ideal and real fluid.
- b) State Pascal's law.
- c) What is metacentric height of a floating body?
- d) What is flow net?
- e) Write the impulse momentum equation.
- f) What do you mean by fundamental units and derived units?
- g) What is a turbulent flow?
- h) What is a venturimeter?
- i) Differentiate between a notch and a weir.
- j) What is the principle of operation of a gear pump?

SECTION-B

- Q2. A solid cylinder of diameter 4m has a height of 3m. Find the meta-centric height of the cylinder when it is floating in water with its axis vertical. Take the specific gravity of cylinder = 0.6.
- Q3. The stream function for a two dimensional flow is given by $\psi = 2xy$, calculate the velocity at the point P(2,3). Find the velocity potential function Φ .
- Q4. What is Euler's equation of motion? Obtain Bernoulli's equation from it.
- Q5. An oil of specific gravity 0.7 is flowing through a pipe of diameter 300mm at the rate of 500 litres/s. Find the head loss due to friction and power required to maintain the flow for a length of 1000 m. Take kinematic viscosity = 0.29 stokes.
- Q6. Discuss the working of a pitot tube with a neat sketch.

SECTION-C

- Q7. State Buckingham's π -theorem. The efficiency η of a fan depends on density ρ , dynamic viscosity μ of the fluid, angular velocity ω , diameter D of the rotor and the discharge Q. Express η in terms of dimensionless parameters.
- Q8. A 30cm \times 15cm venturimeter is provided in a vertical pipe line carrying oil of specific gravity 0.9, the flow being upwards. The difference in the elevation of the throat section and entrance section of the venturimeter is 30cm. The differential U-tube mercury manometer shows a gauge deflection of 25cm. Calculate :
- The discharge of oil.
 - The pressure difference between the entrance and the throat section. Take coefficient of meter as 0.98 and specific gravity of mercury as 13.6.
- Q9. What is a hydraulic intensifier? Explain with a neat sketch its principle and working.