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Total No. of Pages: 02
Total No. of Questions: 09**B. Tech. (AE) (Sem.-4th)**
FLUID MECHANICS AND MACHINERY**Paper Code : BTAE-403****Paper ID: [A1163]****Time: 3 Hrs.****Max. Marks: 60****INSTRUCTIONS TO CANDIDATE:**

- 1) *Section-A is Compulsory.*
- 2) *Attempt any Four questions from Section-B.*
- 3) *Attempt any Two questions from Section-C.*

SECTION-A**(10x2=20)**

- Q1. a) Define real fluid.
- b) Explain surface tension.
- c) Define total pressure.
- d) What is centre of buoyancy?
- e) How is circulation defined?
- f) Explain stream function.
- g) What is an impulse momentum equation?
- h) What is dimensional analysis?
- i) How is venacontracta defined?
- j) How are pumps classified?

SECTION - B**(5 x 4 = 20)**

- Q2. Determine the metacentric height of a floating body.
- Q3. Derive the continuity equation in Cartesian coordinates.
- Q4. Differentiate between free vortex and forced vortex flow.
- Q5. Discuss the Rayleigh's method for dimensional analysis.
- Q6. For the following stream functions calculate velocity at a point (1, 2):
- (i) $\Psi = 3xy$
 - (ii) $y = 3x^2y - y^3$

SECTION-C**(10x2 = 20)**

- Q7. Derive Euler's equation of motion.
- Q8. Water flows in a circular pipe. At one section the diameter is 0.3 m, the static pressure is 260 kPa gauge, the velocity is 3m/s and the elevation is 10m above ground level. The elevation at a section downstream is zero m, and the pipe diameter is 0.15 m. Find out the gauge pressure at the down stream section. Frictional effects may be neglected. Assume density of water to be 999 kg/m³.
- Q9. Describe the construction and operation of an axial pump.

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