

Total No. of Questions : 4]

SEAT No. :

PA-3

[Total No. of Pages : 2

[5931]-3

S.E. (Civil)

201003 : FLUID MECHANICS

(2019 Pattern) (Semester - I)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates :

- 1) *Answer Q1 or Q2, Q3 or Q4.*
- 2) *Answers to the all questions should be written in single answer-book.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator (non programmable) and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

Q1) a) If the velocity distribution over a plate is given by $u = \frac{2}{3}y - y^2$ in which u is the velocity in meter per second at a distance y meters above the plate, determine the shear stress at $y = 0$ and $y = 0.16$ m. Take dynamic viscosity of fluid as 8.65 poise. [8]

b) Derive the expression with usual notations for the total pressure and centre of pressure on vertical plane surface. [7]

OR

Q2) a) A vertical gate closes a horizontal tunnel 5m high and 3 m wide running full with water. The pressure at the bottom of the gate is 196 KN/m². Determine the total pressure on the gate and the position of the centre of pressure. [7]

b) Define : i) Mass Density ii) Specific Gravity iii) Specific Weight iv) Specific Volume v) Capillarity vi) Viscosity vii) Surface Tension viii) Vapor pressure [8]

P.T.O.

- Q3) a)** The velocity components in a two-dimensional flow field for an incompressible fluid are expressed as :

$$u = \frac{y^3}{3} + 2x - x^2y \quad v = xy^2 - 2y - \frac{x^3}{3}$$

Obtain an expression for the stream function Ψ . [7]

- b) Derive Euler's equation of motion along a streamline and obtain the Bernoulli's Equation from it. State also the assumptions made for it. [8]

OR

- Q4) a)** What is meant by HGL and TEL? Explain it with neat sketch. [4]

- b) Explain Venturimeter in detail with neat sketch. [4]

- c) A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.6 m/s, find the discharge in this pipe. Also, determine the velocity in 15 cm pipe if the average velocity in 20cm diameter pipe is 2.1 m/s. [7]

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