AJEENKYA
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End Term Examinations (December 2018)

School: School of Engineering. **Program:** B-Tech- Mechatronics
Course: Strength of Materials & Fluid Mechanics **Course Code**: MTE206
Semester: III **Max Marks:** 20 **Qualifying Marks:** 20 **Duration (mins):** 60mins

Note: 1) Answers should be written in Answer Sheet Provided.
2) Figures to the right indicate full marks.
3) Neat diagrams must be drawn wherever necessary.
4) Use of only electronic pocket calculator is allowed.
5) Assume suitable data, if necessary.
6) Solve any 2 questions from Q1,Q2, Q3 from Section I.

Section-I Fluid Mechanics

Q1.a Define :
(i) Steady flow (ii) Non-uniform flow(iii) Streamline (iv) Path Line (4)

Q1.b The velocity potential function is given by an expression

$$\phi = -\frac{xy^3}{3} - x^2 + \frac{x^3 y}{3} + y^2$$

Find the velocity components in x and y direction & show that ϕ represents case of possible flow. (6)

Q2. (a) State the Bernoulli's Theorem and specify the assumptions made for this. (4)

Q2. (b) An oil of sp.gr.0.8 is flowing through a venturi-meter having inlet diameter 20cm and a throat diameter of 10cm. The oil mercury differential manometer shows a reading of 25cm. Calculate the discharge of oil through the horizontal venturi-meter. Take C_d = 0.98 (6)

Q3. (a) In short explain the equation for friction in flow through pipes. (4)
Q3. (b) Using Buckingham- Pi theorem, show that the velocity through a circular orifice in a pipe is given by:

$$V = \sqrt{2gH}\, f\left(\frac{d}{H}, \frac{\mu}{\rho VH}\right).$$

(6)