

310306

Roll No. |

310306
B. Tech. III - Sem. (Main / Back) Exam., February - 2021
Civil Engineering
3CE4-06 Fluid Mechanics

Time: 2 Hours

Maximum Marks: 80

Instructions to Candidates:

Part - A: Short answer questions (up to 25 words) 5×2 marks = 10 marks.
All five questions are compulsory.

Part - B: Analytical/Problem Solving questions (up to 100 words) 4×10 marks = 40 marks. Candidates have to answer four questions out of six.

Part - C: Descriptive/Analytical/Problem Solving questions 2×15 marks = 30 marks. Candidates have to answer two questions out of three.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

PART - A

- Q.1 Explain Newton's law of viscosity. [2]
- Q.2 Define centre of pressure. [2]
- Q.3 Distinguish between gauge pressure and vacuum pressure. [2]
- Q.4 What is a streamline and what are the characteristics of stream lines? [2]
- Q.5 Write Euler's equation. [2]

[310306]

Page 1 of 3

[1180]

PART – B

Q.1 Explain the three conditions of equilibrium developed when a floating body is given a slight angular displacement. [10]

Q.2 The left limb of a U – tube mercury manometer is connected to a pipe line conveying water, the level of mercury in the left limb being 0.6 m below the centre of pipe line and the right limb is open to atmosphere. The level of mercury in the right limb is 0.45 m above that in the left limb and the space above mercury in the right limb contains Benzene (Specific gravity 0.88) to a height of 0.3 m. Find pressure in the pipe line. [10]

Q.3 Explain the term vorticity. Derive the expression for temporal & convective acceleration for a fluid particle in (i, j, k) coordinate system. [10]

Q.4 Derive and explain an expression for the Darcy – Weisbach equation. [10]

Q.5 The rate of flow of water through a horizontal pipe is $0.25\text{m}^3/\text{s}$. The diameter of the pipe which is 200 mm is suddenly enlarged to 400 mm. The pressure intensity in the smaller is 11.772 N/cm^2 . Identify the: [10]

- (i) Loss of head due to sudden enlargement
- (ii) Pressure intensity in the large pipe
- (iii) Power lost due to enlargement

Q.6 Derive continuity equation from principle of conservation of mass. [10]

PART - C

Q.1 An inclined pipe making an angle of 30° with horizontal has a $300 \text{ mm} \times 150 \text{ mm}$ venturi meter. A U – tube mercury – water differential manometer connected between inlet and throat shows a reading of 300 mm, the flow being upward. If distance between the gauge points along the length of pipe is 450 mm, determine: [15]

- (i) Discharge
- (ii) Pressure at the throat, pressure at the inlet being 50 kPa
- (iii) Head loss

Given, the coefficient of discharge of venturi meter = 0.98.

Q.2 The velocity component for a two dimensional incompressible flow are given by $u = 3x - 2y$ and $v = -3y - 2x$. Show that the velocity potential exists. Determine the velocity potential function and stream function. <https://www.btubikaner.com> [15]

Q.3 A horizontal pipe line 40 m long is connected to a water tank at one end discharges freely into the atmosphere at the other end. For the first 25 m of its length from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8 m above the centre of the pipe. Considering all losses of head which occur, measure the rate of flow (discharge). Take Darcy's coefficient of friction as 0.01 for both sections of the pipe. [15]

<https://www.btubikaner.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से