Total No. of Questions: 22

Total No. of Pages: 02

Roll No. _____

Paper Code
3E1214

B.Tech. III-Sem (Main & Back) January-2026
Civil Engineering
3CE4-06 Fluid Mechanics
3E1214

Time : 3 Hours **Maximum Marks : 70**

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. _____ 2. _____

Part A
(Answer should be given up to 25 words only)

All questions are compulsory **10x2=20**

Q.1. Differentiate between ideal fluids and real fluids.

Q.2. Define capallarity.

Q.3. State the Pascal's law.

Q.4. Distinguish between absolute pressure and vaccume pressure.

Q.5. Briefly explain the term centre of Buoyancy and Metacentre

Q.6. Define stream lines, streak lines and flow net.

Q.7. Define the kinetic energy correction factor.

Q.8. What are the assumption made in Bernoulli's equation?

Q.9. What is Hagen-Poiseuille formula?

Q.10. Define Vena-contracta.

Part-B
(Analytical/Problem solving questions)

Attempt any five questions. **5x4=20**

Q.1. State and explain Newton's law of viscosity. Deduce the expression for the dynamic viscosity.

Q.2. Explain the minor losses in pipes

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Q 3 What is Euler's equation? How will you obtain Bernoulli's equation from it?

Q 4 A three dimensional flow model is given by
$V = 2x^2y\,i + 3y^2z\,j - (4xz - 3z^2)k$
Show that it is a case of possible steady, incompressible fluid flow.

Q 5 What is orificemeter? Derive an expression for discharge through orificemeter.

Q.6 Write a short note on Manometers

Q.7 Calculate specific weight, density and specific gravity of two liters of a liquid which weight 7N

Part-C

(Descriptive / Analytical / Problem Solving / Design questions)

Attempt any three questions. **3x10=30**

Q 1 Derive an expression for the centre of pressure for a plane immersed in water and inclined by an angle θ to free surface of water

Q.2 If for a two dimensional potential flow the velocity function is given by $\phi = x(2y - 1)$, determine the velocity at the point P(2,3) Determine also the value of stream function at the point P

Q.3 Derive the Darcy-weisbach eqation for head loss due to a flow in a pipe in terms of the friction factor f Also develope the relations for friction factor and boundary shear stress in terms of flow parameters for laminar flow

Q 4 A venturimeter of diameters 200mm and 100mm inlet and throat respectively is installed in a vertical pipe carring oil of specific gravity 0.8. The inlet is 1 5m above the throat Pressure gauges installed at the throat and inlet indicate a pressure difference of 9.81KN/m^2.

(a) Determine the discharge through the pipe

(b) If the throat and inlet conneeted to a u-tube manometer containing mercury instead of the pressure gange. Find the difference in mercury levels in the two limbs of u-tube manometer.

Q 5 A hydraulic lift used for lifting automobiles has 25cm diameter ram which slides in a 25cm diameter cylinder. The annlar space being filled with oil having a kinematic viscosity of 3.7cm^2/sec and specific gravity 0 85 If the rate of travel of the ram is 15cm/sec, find the frictional resistance, when 3 3m long arm is engaged in cylinder.

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