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RETEST EXAMINATION (OLD)

November/December – 2025

Semester : 3rd (Old)

Subject Code : Me-302

**Subject Name : FLUID MECHANICS AND
FLUID MACHINES**

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Instruction :

- *All* questions are compulsory.

1. Fill in the blanks : 10

(a) Crude oil is the example of _____ type of fluid.

(b) A _____ manometer is used to measure the pressure at a point of fluid.

(c) A Foot valve prevents the flow of liquid from the _____ to the _____ in a centrifugal pump.

[Turn over

(d) The metacentric height is the distance between _____ and _____.

(e) A draft tube is used with _____ turbine.

(f) Adjustable runner blades are found in _____ turbine.

(g) The unit of Kinematic viscosity is _____.

(h) The centre of pressure is always _____ the centre of gravity.

2. Write True or False : $1 \times 5 = 5$

(a) Venturimeter used for measuring the rate of flow through the pipeline.

(b) The unit of density of fluid is N/m^3 .

(c) The specific gravity of Mercury is 13.6.

(d) Pitot tube is used for measuring the velocity of flow.

(e) In a pipe flow, the flow will be laminar, if the Reynolds number is less than 2000.

3. Answer any five questions : $5 \times 5 = 25$

(a) Define the terms :
Specific gravity, density, viscosity.

(b) If the Specific gravity of petrol is 0.8, calculate its density, specific volume and specific weight.

(c) State and explain the Hydrostatic law.

(d) Define the terms :
Total pressure and Meta centre.

(e) Differentiate between :
(i) Laminar and Turbulent flow.
(ii) Steady and unsteady flow.

(f) Define the three hydraulic co-efficient and derive the relation among them.

(g) State the Bernoulli's theorem. Write three assumptions made for Bernoulli's theorem .

(h) Define slip of a pump ? What is negative slip ? Why it occurs ?

(i) Mention three differences between impulse turbine and reaction turbine.

(j) What is draft tube ? What are its different types ?

(k) What are the various losses of head(energy) in case of pipe flow ?

4. Water is flowing in a pipeline of 300 m long and 20 cm in diameter at a velocity of 10 m/sec. Find the head loss due to friction, if the coefficient of friction is 0.0075. 5

5. A horizontal venturimeter 160 mm \times 80 mm was used to measure the flow of water through a pipeline. When a differential manometer was connected to the inlet and its throat, it showed 20 cm of Hg. Calculate the discharge, assuming the coefficient of discharge of the venturimeter as 0.96. 5

6. A rectangular channel is 4 m wide and 2 m deep and is laid at a slope of 1 in 4500. Find the velocity of flow and discharge, assuming Chezy's constant, $C = 60$. 5

7. (a) A differential manometer was connected with two points at the same level in a pipe containing liquid of sp. Gr. 0.85. Find the difference of pressures at the two points, if the difference of mercury levels be 150 mm. 5

Or

(b) A triangular plate of base 3 m and height 4 m lies immersed vertically in water with the apex downward. The base of the plate is 1 m below the free water surface. Determine the total pressure and centre of pressure. 5

8. (a) A single acting reciprocating pump, running at 50 r.p.m , delivers $0.03 \text{ m}^3/\text{s}$ of water. The diameter of the piston is 200 mm and stroke length 400 mm. calculate

- (i) The theoretical discharge of the pump
- (ii) Coefficient of discharge
- (iii) Slip and percentage of slip of the pump.

5

Or

(b) A Kaplan turbine develops 9000 kW power under a head of 10 metres with an overall efficiency of 90%. If the flow velocity is 4 m/sec and boss diameter is 0.3 times the runner diameter, find the diameters of the boss and runner.

5

9. A jet of water of 20 cm in diameter moving with a velocity of 20 m/sec impinges on a moving vertical plate which is moving with a velocity of 10 m/sec. Calculate the force on the plate and work done by the jet.

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