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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 :

1×5=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 :

5×5=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.

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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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