

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE, APRIL - 2025**

**HYDRAULIC MACHINES**

[Maximum marks: 100]

[Time: 3 Hours]

**PART – A**

**Maximum marks: 10**

**I.** (Answer *all* the questions in one or two sentences. Each question carries **2** marks)

1. State the equation of force exerted by the jet on a stationary fixed plate.
2. Define impact of jet.
3. Classify turbine according to the direction of flow through Runner.
4. Define unit power of a turbine.
5. Define a positive displacement pump.

(5 x 2 = 10)

**PART – B**

**Maximum marks: 30**

**II.** (Answer any *five* of the following questions. Each question carries **6** marks)

1. A jet of water 40 mm diameter impinges on a fixed plate normally at a velocity of 25 m/s. Find the force exerted on the plate.
2. Describe an impulse turbine.
3. Distinguish between radial flow and axial flow turbine.
4. Explain main components of Francis turbine with sketch.
5. Briefly explain the functions of Draft tube in reaction turbine.
6. Explain the function of air vessel with Sketch.
7. Explain the principle of working of reciprocating pump with figure.

(5 x 6 = 30)

**PART – C**

**Maximum marks: 60**

(Answer *one full* question from each unit. Each full question carries **15** marks)

**UNIT – I**

- III.** (a) Derive an expression for the force of jet striking on a flat vertical moving plate (7)  
(b) Explain the principle of propulsion of jet with suitable sketch. (8)

**OR**

- IV.** (a) Derive an equation for force exerted by a jet of water on a fixed inclined plate. (7)
- (b) A jet of water 250 mm Dia. impinges normally on a flat plate moving at 2m/s in the same direction as that of the jet, if the discharge is 500 litres/s, find the force exerted by the jet on the plate. Find also the work done on the plate per second and efficiency of the jet (8)

**UNIT - II**

- V.** (a) Write the classifications of turbines. (7)
- (b) A Pelton turbine develops 3.75 MW of power at an effective head of 200 m. If the discharge through the nozzle is 2000 l/s, calculate the overall efficiency of the turbine. (8)

**OR**

- VI.** (a) Sketch and explain the governing of Pelton wheel. (7)
- (b) A double Jet Pelton wheel operates under a 50 m head and develops 90 KW at an overall efficiency of 90% and coefficient of velocity of 0.96 find the jet diameter. (8)

**UNIT - III**

- VII.** (a) Explain the working of Kaplan turbine. (7)
- (b) The External diameter of an inward flow reaction turbine is 600 mm. The Width of the wheel at inlet is 150 mm, and the velocity of flow at inlet is 1.25 m/s. find the rate of flow passing through the turbine. (8)

**OR**

- VIII.** (a) Compare impulse and reaction turbine. (7)
- (b) What are the factors to be considered while selecting a turbine? Explain. (8)

**UNIT – IV**

- IX.** (a) Explain the function of spiral casing for a centrifugal pump. Name the types of casing. (7)
- (b) A centrifugal pump is required to lift water to total head of 30m at the rate of 12.5 l/s. Find the power required for the pump if its over all efficiency is 74%. (8)

**OR**

- X.** (a) Explain the working of air lift pump with sketch. (7)
- (b) Sketch a hydraulic ram and explain its working. (8)

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