

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2024**

HYDRAULIC MACHINES

(Maximum Marks:100)

(Time: 3 Hours)

PART - A

(Maximum Marks : 10)

Marks

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

1. What is meant by impact of Jet?
2. Define Hydraulic Machine
3. What is meant by an Axial flow turbine?
4. List any 4 classifications of reaction turbines.
5. Differentiate turbine and pump.

(5 x 2 = 10)

PART - B

(Maximum Marks: 30)

II Answer **any five** questions from the following. Each question carries 6 marks.

1. Derive an equation of Jet impinging on a stationary vertical plate at the centre.
2. A jet of water 50 mm diameter and with a velocity of 15 m/s strikes a flat plate held normal to the direction of the jet. Find the force exerted by the jet if the plate moves with their velocity of 5 m/s in the direction of the jet.
3. Explain Pelton turbine with sketch.
4. Compare reaction turbine with impulse turbine.
5. Explain the working of single acting reciprocating pump with sketch.
6. Explain the working of air lift pump.
7. Explain the working of hydraulic ram.

(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 equation for force exerted by the jet on a stationary inclined plate. (7)
- (b) Explain the propulsion of ships by water jets. (8)

OR

- IV (a) Derive an expression for the force of Jet striking on a flat vertical moving 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) Define Water power, Brake power, Shaft power, and overall efficiency of turbine. (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) Explain the governing of Pelton turbine with sketch. (7)
- (b) A turbine is supplied with 150 l/s of water under an effective head of 225 m. Find the power developed by the turbine when the overall efficiency is 70% . (8)

UNIT – III

- VII (a) Explain various types of draft tubes. (7)
- (b) Explain the working of inward and outward flow reaction turbine with neat Sketch. (8)

OR

- VIII (a) Explain Kaplan turbine with neat sketch. (7)
- (b) A turbine develops 9000 KW when running at 100 RPM. The head on the turbine is 30 m. if the head on the turbine is reduced to 18 m, determine the speed and power developed by the turbine. (8)

UNIT – IV

- IX (a) Explain components and piping system of centrifugal pumps. (7)
- (b) Explain specific speed of a centrifugal pump. Also selection criteria of centrifugal pump based on specific speed. (8)

OR

- X (a) Explain Cavitation in centrifugal pump. (7)
- (b) Explain Jet pump with sketches. (8)
