TED (15) 6022 **N20-01573** Reg.No.....

(Revision-2015) Signature.....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER-2020

HYDRAULIC MACHINES

[Maximum marks: 75] (Time: 2.15 Hours)

PART – A

I. Answer any ***three*** questions in one or two sentences. Each question carries 2 marks

1. State the expression for the efficiency of jet of water when it is striking on a series of vanes.
2. How the hydraulic turbines are classified according to the direction of flow through runner?
3. How the runner of a Kaplan turbine differs from that of a Francis turbine?
4. Define NPSH of a centrifugal pump.
5. Define slip of a reciprocating pump. (3 x 2 =6)

PART – B

II. Answer any ***four*** of the following questions. Each question carries 6 marks

1. A jet of water of 2.5 cm diameter, moving with a velocity of 20 m/s strikes a hinged square plate of weight 98.1 N at the centre of the plate. The plate is uniform thickness. Find the angle through which the plate will swing.
2. Derive the expression for force exerted by a jet of water impinging on a stationary flat vertical plate in the direction of the jet.
3. A double jet Pelton wheel operates under a head of 50 meters and develops 90 Kw at an overall efficiency of 90% and co efficient of velocity of 0.96. Find the jet diameter.
4. Define unit speed, unit discharge and unit power of a turbine.
5. Explain the working of outward radial flow reaction turbine with a sketch
6. Describe the different types of casing of a centrifugal pump.
7. Compare centrifugal pump and a reciprocating pump. (4 x 6= 24)

PART – C

III. Answer ***any of the three units*** from the following. Each question carries 15 marks

UNIT –I

(a) Derive am expression for work done by a jet of water impinging on a moving flat vertical plate (8)

(b) A jet of water of diameter 7.5cm strikes on a curved plate at its centre with a velocity of 20 m/s. The curved plate is moving with a velocity of 8m/s in the direction of the jet. The jet is deflected through an angle of 165^0. Assuming the plate is to be smooth, find the force exerted on the plate and work done. (7)

OR

IV.(a). Obtain an expression for work done by a jet of water impinging on a curved moving plate in the direction of jet. (8)

(b). A jet of water of diameter 100mm strikes flat plate normally with a velocity of 15m/s the plate is moving with a velocity of 6m/s in the direction of the jet. Find the force and work done by the jet. (7)

UNIT-II

V.(a). A Pelton wheel working under a head of 250 m develops 6000 kW running with 600 rpm and an overall efficiency of 90%. The ratio of jet diameter to wheel diameter is 1/8 ,the coefficient of velocity for the nozzle is 0.98 and speed ratio is 0.46. Determine (i)Discharge (ii) Diameter of wheel (iii)Number of jets (8)

(b). Explain the working of Pelton wheel with a diagram (7)

OR

VI.(a). A Pelton wheel develops 2000 kW under a head of 100 meters and with an overall efficiency 85%. Find the diameter of the nozzle, if the coefficient of nozzle is 0.98. (8)

(b). Explain the governing of Pelton wheel with the help of a sketch (7)

UNIT-III

VII.(a) A turbine is to operate under a head of 25m at 200 rpm. The discharge is $9m^3/s$. If the overall efficiency is 90%, determine (i)Power generated (ii) specific speed of the turbine (iii) Type of turbine (8)

(b) Explain with sketch the working of inward radial flow reaction turbine (7)

OR

VIII.(a) Explain different types of draft tubes (8)

(b) Differentiate between impulse turbine and reaction turbine (7)

UNIT-IV

IX.(a) Explain the working of a single acting reciprocating pump with the help of a diagram (8)

(b) With the help of a sketch explain the working of Hydraulic ram (7)

OR

X.(a) A centrifugal pump having an overall efficiency of 78% is discharging 30 liters of water per second through a pipe of 150 mm diameter and 125 meter long. Calculate the power required to drive the pump, if the water is lifted through a height of 25 meter. Take coefficient friction as 0.01. (8)

(b). With the help of a sketch explain the working of an air lift pump (7)

*****