DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER - 2023

HYDRAULIC MACHINES

(Maximum Marks:100)   (Time: 3 Hours)

PART - A
(Maximum Mark : 10)

Marks

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

1. Define fluid jet.

2. Define specific speed of a turbine.

3. Differentiate turbine and pump.

4. What do you mean by cavitation?

5. Give the expression for the force excreted by the jet on a flat fixed vertical plate.

(5 x 2 = 10)

PART - B
(Maximum Mark: 30)

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

1. Find the force exerted by the jet of water of diameter 75mm on a stationary flat plate, when the jet strikes the plate normally with velocity of 20m/s.

2. Differentiate impulse turbines & reaction turbines.

3. What do you mean by multistage centrifugal pumps? List the advantages.

4. Write notes on: a) cavitation   b) priming.

5. Compare centrifugal pumps and reciprocating pumps.

6. Explain the working of hydraulic ram with suitable sketch.

7. Describe the working of jet pump.

(5 x 6 = 30)

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PART – C
(Maximum Mark: 60)
(Answer *one full* question from each unit. Each full question carries 15 marks.)

UNIT - I

III   (a) Explain the principle of jet propulsion.   .   (8)

      (b) Find the force exerted by the jet on a curved moving plate when the plate is
           moving in the direction of jet.   (7)

OR

IV   (a) Find the force exerted by the jet on a flat vertical plate moving in the direction
           of jet.   (8)

      (b) A nozzle of 50 mm diameter delivers a stream of water at 20m/s perpendicular
           to a plate that moves away from the jet at 5m/s. Find :

           a) The force on the plate

           b) The work done

           c) The efficiency of the jet   (7)

UNIT –II

V   (a) Classify water turbines with examples.   (8)

      (b) Explain the working of governing system used in pelton turbine with a neat
           sketch.   (7)

OR

VI   (a) Sketch & explain important parts and functions of a pelton turbine.   (8)

      (b) A double jet pelton wheel operates under a 50m head and develops 90kw at
           an overall efficiency of 90% and coefficient of velocity of 0.96. Find the jet
           diameter.   (7)

UNIT – III

VII   (a) Explain the parts and the functions of Francis turbine with a neat sketch.   (8)

      (b) Describe the functions of draft tubes. What are the various types of draft
           tubes used in reaction turbines?   (7)

OR

VIII (a) Explain the working of Kaplan turbine with suitable sketch.   (8)

      (b) Find the specific speed and type of water turbine required to develop
           9MW under a head of 30 meters when running at 140 rpm.   (7)

UNIT – IV

IX   (a) With suitable sketch explain the types of casings used in centrifugal pumps.   (8)

       (b) Sketch and explain the working of single acting reciprocating pump.   (7)

OR

X   (a) A single acting reciprocating pump has a speed of 60rpm. it has a plunger diameter of 200mm and a stroke of 300mm. the suction and delivery heads are 5m and 16m respectively. Determine the actual power required to drive the pump if the efficiency of the pump is 70%.   (8)

       (b) Sketch & explain the working of multistage centrifugal pumps.   (7)

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