TED (15) – 6022

(REVISION — 2015)

Reg. No...

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

HYDRAULIC MACHINES

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

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

1. List any two application of jet of water.

2. State the function of spear in pelton wheel.

3. Define reaction turbine.

4. State the advantages of jet pump.

5. Define NPSH.   (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Analyze the principle of jet propulsion.

2. A jet of water of diameter 75mm moving with a velocity of 25m/s strikes a fixed plate in such a way that the angle between the plate and the jet is 60°. Find the force exerted by the jet on the plate (i) in the direction normal to the plate and (ii) in the direction of the jet.

3. Enumerate the functions of governor in an impulse turbine.

4. Discuss the functions of draft tube.

5. Distinguish between impulse turbine and reaction turbine.

6. Find the specific speed of a centrifugal pump delivering 675 liters of water per second against a head of 13.8m at 700 rpm.

7. Classify reciprocating pump.   (5×6 = 30)

[157]   [P.T.O.

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

Marks

UNIT — I

III (a) Derive an expression for work done by a jet of water impinging on a moving vertical plate.

8

   (b) A jet of water 5cm in diameter and moving with a velocity of 15m/s impinges on a series of vanes moving with a velocity of 5m/s. Determine (i) force on the plate (ii) work done and (iii) efficiency of jet.

7

OR

IV (a) Obtain an expression for force exerted by a jet on an inclined fixed plate in the direction of jet.

8

   (b) A jet of water of 2.5 cm diameter moving with a velocity of 10 m/s strikes a hinged plate of weight 98.1 N at the centre of the plate. Find the angle through which the plate is swing.

7

UNIT — II

V (a) Describe the main components of a Pelton wheel.

8

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

7

OR

VI (a) Classify water turbines.

8

   (b) A Pelton wheel develops 3.75MW power at an effective head of 200m. If the discharge through the nozzle is 2000 lps, calculate the overall efficiency of the turbine.

7

UNIT — III

VII (a) Explain with sketch the working of Kaplan turbine.

8

   (b) Explain the significance of specific speed of a turbine.

7

OR

VIII (a) Define specific speed and unit quantities of turbine.

8

   (b) A Kaplan turbine working under a head of 56m develops 10MW. The hub diameter of the runner is 0.35 times the outer diameter. The speed ratio and flow ratio are 2.1 and 0.67 respectively. If the overall efficiency is 85%, find the discharge through the turbine and diameter of the runner.

7

UNIT — IV

IX (a) Describe the main components of a reciprocating pump with sketches.

8

   (b) Explain cavitation and priming of centrifugal pump.

7

OR

X (a) Distinguish between volute casing and vortex casing in centrifugal pump.

8

   (b) A double acting reciprocating pump running at 60rpm is discharging 33.5 liters of water per second. The pump has a stroke of 0.35m. The diameter of the piston is 0.25m. The delivery and suction head are 18m and 4.5m respectively. Find the slip and power required to drive the pump.

7

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