TED (15) – 6022

(REVISION — 2015)

Reg. No...

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

HYDRAULIC MACHINES

[*Time* : 3 hours

(Maximum marks : 100)

Marks

PART — A

(Maximum marks : 10)

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

1. Define impact of jets.

2. Write the equation for angle of swing of a vertical swing plate.

3. Name the machine which convert hydraulic energy into mechanical energy.

4. List any two types of reaction turbine.

5. Define specific speed of a centrifugal pump.   (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Describe how ships move in a sea using jet propulsion.

2. A jet of water of diameter 50mm strikes a fixed plate in such a way that the angle between the plate and the jet is 30°. The force exerted in the direction of jet is 1471.5N. Determine the rate of flow of water.

3. Classify water turbines.

4. Define hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine.

5. Define unit power, unit speed and unit discharge.

6. Explain the function of Air Vessels.

7. Describe the function of casing in centrifugal pumps. Name the types.   (5×6 = 30)

PART — C

(Maximum marks : 60)

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

Unit — I

III   (a) Derive the expression for the force developed, work done and efficiency by the jet strikes on a series of vanes.   8

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[P.T.O.

Marks

(b) A jet of water of diameter 100mm moving with a velocity of 30m/s strikes a curved fixed symmetrical plate at the centre. Find the force exerted by the jet of water in the direction of the jet. If the jet is deflected through an angle of 120° at the outlet of the curved plate.   7

OR

V (a) Deduce an expression for force exerted by a jet of water on an inclined fixed plate in the direction of jet and perpendicular to the direction of jet.   8

(b) A jet of water of diameter 7.5 cm strikes a curved plate at its centre with a velocity of 20m/s. The curved plate is moving with a velocity of 8m/s in the direction of jet. The jet is deflected through an angle of 165°. Assuming the plate is smooth, find (i) force exerted on the plate in the direction of jet (ii) Power of the jet and (iii) Efficiency of the jet.   7

Unit — II

V (a) Describe the working of Pelton wheel with sketch.   8

(b) Two jets strikes the buckets of a Pelton wheel which is having shaft power as 15450 Kw. The diameter of each jet is given as 200mm. If the net head on the turbine is 400m, find the overall efficiency of the turbine. Take Cv = 0.97.   7

OR

T (a) Sketch the governing system used in impulse turbine.   8

(b) A Pelton wheel is supplied water under a head of 200m through a 10cm diameter pipe. If the quantity of water supplied is 1.25 cubic meter per second, find the number of jets. Assume Cv = 0.97.   7

Unit — III

I (a) Describe the working principle and list the components of Francis turbine.   8

(b) Define a draft tube. Mention its classifications.   7

OR

I (a) Compare impulse turbine and reaction turbine.   8

(b) Discuss the selection of turbine based on specific speed and head.   7

Unit — IV

(a) Explain the working of Hydraulic ram with a neat sketch.   8

(b) A double acting reciprocating pump running at 40rpm is discharging 1m³ of water per minute. The pump has a stroke of 400mm. The diameter of the piston is 200mm.The delivery and suction head are 20m and 5m respectively. Find the slip of the pump and power required to drive the pump.   7

OR

(a) Compare centrifugal pump and reciprocating pump.   8

(b) A centrifugal pump delivers 0.03m³/s of water to a height of 20 m through a pipe of 80m long and of 100mm diameter. If the overall efficiency of the