

Course/Semester-B Tech Mech Engg (6th Sem)

Subject- Fluid Machinery

Sub Code- BTME-602A/603

Reg' (2015 Batch)

RP: 2011-2014

Time- 3hrs

Note - Section A is compulsory. Attempt all question from section B.

Time -3 hrs

MM-60

SECTION A

(2X10=20)

Q1 (a) Define the term degree of reaction as applied to hydraulic turbines.

(b) List functions of a draft tube.

(c) What is function of a hydraulic accumulator?

(d) Why efficiency of a hydraulic pump is less than that of a hydraulic turbine?

(e) What is purpose of priming in case of a centrifugal pump?

(f) Give comparison between Francis and Kaplan turbine.

(g) What do you mean by net positive suction head (NPSH)?

(h) Explain effect of air vessels in case of a reciprocating pump.

(i) Explain what is cavitation.

(j) How a turbo machine is classified on the basis of path followed by the fluid?

SECTION B

(8X5=40)

Q2 With the help of neat sketch explain the construction and operation of a hydraulic torque converter?

OR

List and explain parameters that are considered while designing a pelton wheel

Q3 Explain the characteristic features of Kaplan turbine.

The following data refers to the runner of Kaplan turbine which yields 8850 KW at the turbine shaft : net available head 5.5m, speed ratio 2.1, flow ratio 0.67, and overall efficiency 85%. Presuming that the hub diameter of the wheel is 0.35 times the outside diameter, workout the runner diameter and the rotational speed.

OR

Explain constant head characteristics of Kaplan and pelton turbine.

Q4 A centrifugal pump impeller has diameter of 60 cm and the width of 6cm at the outlet. The pump runs at 1450 rpm and delivers $0.8 \text{ m}^3/\text{s}$ against a head of 80m. The leakage loss after the impeller is 4 percent of discharge, the external mechanical loss is 10KW and the hydraulic efficiency is 80 percent. Determine the blade angle at the outlet, the power required and the overall efficiency of the pump.

OR

With the help of neat sketch explain construction and operation of francis turbine. Explain how work done by the runner is calculated.

Q5 Explain the working principle of a reciprocating pump. Why a reciprocating pump is called a positive displacement pump?

A single acting reciprocating pump has the plunger diameter of 20cm and the stroke of 30cm. The pump discharges 0.53 m^3 of water per minute at 60rpm. Find the theoretical discharge, co-efficient of discharge, and percentage slip of pump. Further, if suction and delivery heads are 4m and 12m respectively, work out power required to run the pump.

OR

Show that in case of jet striking the flat plates mounted on wheels, the efficiency will be the maximum when the tangential velocity of the wheel is half that of the jet.

A jet of water, cross sectional area 20 cm^2 , issues with the velocity of 20 m/s and strikes a stationary flat plate held at 30-degree to the axis of jet. Find the force exerted by the jet on the plate, and workout the components of force in the directions normal to the jet. Also find how the discharge gets distributed after striking the plate.

Q6 Depict a well labelled sketch of single jet horizontal shaft Pelton turbine.

A Pelton wheel working under the head of 800m develops 13230 KW running at 600 rpm with an overall efficiency of 85%. The ratio of jet diameter to wheel diameter is $1/15$, the coefficient of velocity for nozzle is 0.97 and the speed ratio is 0.46. Make calculations for rate of flow, diameter of wheel and number of jets.

OR

Explain (a) Governing of impulse turbines.

(b) Efficiencies of centrifugal pump.