

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ME) (Sem.-6th)

FLUID MACHINERY

Subject Code : ME-306

Paper ID : [A0821]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

- 1. SECTION-A is COMPULSORY.**
- 2. Attempt any FOUR questions from SECTION-B.**
- 3. Attempt any TWO questions from SECTION-C.**

SECTION-A

(10 × 2 = 20 Marks)

1. (a) Make an inlet velocity triangle for Pelton wheel.
(b) Define degree of reaction.
(c) How is number of buckets decided in a Pelton turbine ?
(d) What is the purpose of Surge tank ?
(e) Do you keep delivery valve open or closed in case of
(a) Reciprocating Pumps
(b) Centrifugal Pumps
(f) Define specific speed of pump and what are its units?
(g) Define Thoma cavitation factor and for what it is used ?
(h) Which pump is used as a feed pump in a high pressure boiler ?
(i) What is the difference between fluid coupling and torque convertor ?
(j) What are the losses taking place in a hydro power plants ?

SECTION-B

(4 × 5 = 20 Marks)

2. A jet 8 cm dia at 20 m/s strikes a curved vanes moving at 7 m/s. The vanes are arranged such that each vane appears before the jet in the same position and at same velocity. The jet is deflected through 160°. Find the efficiency of the system.

3. A jet of water strikes at the centre of a curved vane and the vane moves in the direction of jet. If the outgoing jet makes angle θ with entering jet, show that for max. η , the vane velocity is $\frac{1}{3}$ of jet velocity and its value is $\frac{8}{27} (1 + \cos \theta)$.
4. A Pelton wheel develops 8421 kW under a head of 320 m. If speed is 700 rpm and overall η is 87%, Coeff. of velocity = 0.98, speed ratio 0.45 and jet ratio is 6. Find wheel dia, jet dia and number of jets. (5)
5. What is the difference between Kaplan and Propeller turbines ? How do you proceed to design various dimensions and angles in case of Kaplan Turbine ? Under what conditions would you prefer to use Kaplan Turbine ?
6. A centrifugal pump delivers 1.27 m³/minute at 1200 rpm. The impeller dia is 35 cm and breadth at outlet is 12.7 mm. The pressure difference between inlet and outlet of pump casing is 272 kN/m². Calculate impeller exit blade angle if monometric η is 63%. (5)

SECTION-C

(2 × 10 = 20 Marks)

7. (a) What is meant by cavitation ? What are its effects and discuss various methods of avoiding cavitation. (6)
(b) What is NPSH and discuss its significance ? (4)
8. (a) Under what condition slip is negative in reciprocating pump ? (2)
(b) Show that the %age saving in work due to a vessel in a reciprocating single acting pump is 84.8% of friction losses. (3)
(c) A single acting pump has a piston dia 150 mm and crank radius 300 mm. The delivery pipe is 75 mm dia and 30 m long. The water is lifted to 30 m. Find the max. speed at which the pump may be run without separation during delivery stroke, which occurs at 2.5 m of water absolute. (5)
9. (a) What are advantages of differential accumulator over simple accumulator ? (2)
(b) Explain the working and construction of torque convertor. (6)
(c) The diameter of fixed ram and fixed cylinder of an intensifier are 10 and 25 cm respectively. If pressure of water supplied to fixed cylinder is 30 bar, find the pressure of water flowing through fixed ram.