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Total No. of Questions : 09]   [Total No. of Pages : 03

B.Tech. (Sem. - 6th)
FLUID MACHINERY
SUBJECT CODE : ME - 306
Paper ID : [A0821]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours   **Maximum 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

Q1)   (10 × 2 = 20)

a)   Write Impulse-Momentum equation.

b)   How are hydraulic turbines classified.

c)   How will you classify reciprocating pumps.

d)   Write the utility of Air Lift Pump.

e)   Define the term Net or Effective head.

f)   What is the function of scroll casing in reaction turbine?

g)   What do you mean by the capacity of Hydraulic accumulator?

h)   What are air vessels?

i)   What is the principle of working of a reciprocating pump?

j)   What is the efficiency of a draft tube in hydraulic turbine?

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Section - B

(4 × 5 = 20)

Q2) Point out the significance of word "Free" in impact of free jets. Show that when a jet of water impinges on series of curved vanes, maximum efficiency is obtained when the vane is semicircular in section and the velocity of the vane is half that of jet.

Q3) A pelton wheel is supplied with water under a head of 45m and at a rate of 48m³/min. The buckets deflect the jet through 165° and the mean bucket speed is 14m/s. Calculate the power delivered to the shaft and overall efficiency of the machine. Assume coefficient of viscosity 0.985 and mechanical efficiency 0.95.

Q4) Explain the factors which decide the choice for a particular hydraulic turbine for a hydro power plant.

Q5) Explain the working of a reciprocating pump with help of neat sketch of its installation.

Q6) Explain with help of neat sketch the construction and working of hydraulic crane and lift.

Section - C

(2 × 10 = 20)

Q7) (a) Explain the terms manometric efficiency, mechanical efficiency, overall efficiency as applied to centrifugal pumps.

(b) A reaction turbine of 0.5m diameter develops 200kW whilst running at 650 revolutions per minute and requires a discharge of 0.75 m³/s. The pressure head at entrance to turbine is 28m, the elevation of the turbine casing above tail water level is 1.8m and the water enters the turbine with a velocity of 3.5m/s calculate

(i) the effective head and efficiency,

(ii) the speed, discharge and power if the same machine is made to operate under a head of 65m.

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Q8) (a) What is cavitation? Why does cavitation occur? Explain how the suction height of a turbine above tail race level is limited by cavitation?

(b) A double acting reciprocating pump having cylinder dia 15 cm and stroke 30 cm is used to raise water through a height of 30 meters. If the pump is working at 30 rpm and the pump efficiency is 73%, what power is required to drive the pump? Neglect the effect of piston rod area.

Q9) Write short notes on :

(a) Hydraulic accumulator.

(b) Design parameters for runners of reaction turbines.

(c) Basic components of turbo machines.

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