B. Tech.
(SEM. VI) EXAMINATION. 2006-07
FLUID MACHINERY

Time : 3 Hours] [Total Marks : 100

Note :  (1) Attempt all questions.
(2) All questions carry equal marks.
(3) Assume suitably, missing data, if any.

1 Attempt any four parts of the followings :
   (a) What are the bases of classification of fluid machines?
   (b) Derive linear-momentum equation.
   (c) What is the difference between the force of jet when it impinges on a single moving flat plate and the force of jet when it strikes on a series of moving plates?
   (d) What is significance of Euler's fundamental equation for fluid machines?
   (e) Why is the jet deflected by the buckets between 160° to 165° instead of 180°?
   (f) What importance has the ratio.

\[ m = \frac{\text{mean diameter of pelton wheel}}{\text{Least diameter of jet}} \]
2 Attempt any **four** parts of the following:

(a) Describe briefly how the governing of a Kaplan Turbine is carried out.

(b) What are the functions of a draft tube?

(c) Why is it necessary to choose the number of Francis runner blades as odd and the number of guide vanes as even.

(d) What is meant by ‘cavitations’? How and where does it occur in water power plant?

(e) Deduce an expression for the specific speed of a hydraulic turbine and explain how it is useful in practice.

(f) A Francis turbine with an overall efficiency of 76% is required to produce 150 kW. It is working under a head of 8 m. The peripheral velocity \( = 0.55 \sqrt{2 gH} \) and the radial velocity of flow at inlet is 0.95 \( \sqrt{2 gH} \). The wheel runs at 150 rpm and the hydraulic losses in the turbine are 20% of the available energy. Assuming radial discharge, determine:

(i) guide blade angle (ii) the wheel vane angle at inlet, and (iii) diameter of wheel at inlet.

3 Attempt any **two** parts of the followings:

(a) How the centrifugal pumps are classified?

(b) What are the different efficiencies of a centrifugal pump?

(c) Explain the effect of variation of speed on discharge, head and power.
(d) Describe cavitations and separation phenomenon in centrifugal pump.

4 Attempt any two parts of the following:
(a) Explain the working principle of a centrifugal pump with the help of a line sketch, naming all the parts.
(b) Explain working of positive rotary pumps namely gear and vane pumps with the help of neat sketches.
(c) Why is the suction height of a pump limited? On what factors does it depend?

5 Attempt any two parts of the following:
(a) Describe the working of a hydraulic accumalator with the help of a neat sketch. Also define the capacity of an accumalator.
(b) Explain the working of a hydraulic intensifier with the aid of a neat sketch.
(c) State and draw the characteristics of fluid coupling and torque convertor.