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**B.Tech. (Sem. - 6<sup>th</sup>)**  
**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) Define the term Impact of jet.
- b) What are the functions of draft tube?
- c) Define the term Gross head.
- d) List the advantages of Kaplan Turbine over Francis Turbine.
- e) What are basis on which Hydraulic Turbines are classified.
- f) Define accumulator.
- g) What is the principle of working of a Centrifugal Pump?
- h) What are the functions of a multistage pump?
- i) What is Thoma's cavitation factor for Turbine?
- j) What is cavitation and how can it be avoided in reaction turbine?

**Section - B**

**(4 × 5 = 20)**

- Q2)** A jet of water moving at 12m/s impinges on a concave shaped vane to deflect the jet through 120° when stationary. If the vane is moving at 5m/s, find the angle of jet so that there is no shock at inlet. Also compute the absolute velocity of the jet at exit both in magnitude and direction, and the work done per second per kg of water. Assume that the vane is smooth.

**Q3)** A double jet Pelton wheel has a specified speed of 16 and is required to deliver 1000 kW. The supply of water to the turbine is through a pipeline from a reservoir whose level is 350 m above the nozzles. Allowing 5% for friction loss in pipe make calculations for speed in rev/min, diameter of jets and mean diameter of bucket circle. Take velocity coefficient = 0.98, speed ratio = 0.46 and overall efficiency = 85%.

**Q4)** Discuss the effect of air vessels in the performance of reciprocating pumps.

**Q5)** What are the basic components of a turbo machine? How it is classified?

**Q6)** State briefly the functions of the spiral casing, guide vanes and the draft tube of a reaction water turbine.

### Section - C

(2 × 10 = 20)

**Q7)** (a) Why is the efficiency of Kaplan turbine nearly constant irrespective of speed variation under load?

(b) A Kaplan turbine is to be designed to develop 7350 kW; the net available head being 5.5 m, the other relevant data is speed ratio = 2.08; flow ratio = 0.68; overall efficiency = 60% and diameter of bore =  $\frac{1}{3}$ rd of the runner diameter. Make calculations for runner diameter, its speed and specific speed.

**Q8)** (a) Discuss the influence of exit blade angle on the performance and efficiency of a centrifugal pump. Assume radial flow at entrance.

(b) A centrifugal pump is required to lift water against total head of 40 m at the rate of 50 liters per second. Find the power of the pump, if the overall efficiency is 62%.

**Q9)** Explain:

- (a) Differential accumulator.
- (b) Fluid coupling
- (c) Intensifier.

