

**May 2019**  
**B.Tech - 4th Sem**  
**Fluid Machines (ME-208C)**

**Duration: 3 Hours**

**Max. Marks: 75**

**Instructions:**

- It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
- Answer any four questions from Part-B in detail.
- Different sub-parts of a question are to be attempted adjacent to each other.

**PART A**

- Q1** (a) Explain the principle of jet propulsion of ship. (1.5)  
(b) Explain impulse momentum principle. (1.5)  
(c) Define hydraulic efficiency and mechanical efficiency of a turbine. (1.5)  
(d) How will you classify the turbine? (1.5)  
(e) Differentiate between propeller and Kaplan turbine. (1.5)  
(f) Define the term degree of reaction. (1.5)  
(g) What is the difference between single-stage and multistage pumps. (1.5)  
(h) Draw a neat sketch of hydraulic ram. (1.5)  
(i) What are the functions of an air vessel in a reciprocating pump? (1.5)  
(j) Define Froude's number and Mach number. (1.5)

**PART B**

- Q2** Find an expression for the efficiency of a series of moving curved vanes when a jet of water strikes the vanes at one of its tips. Also prove that maximum efficiency is 50%. (15)
- Q3** (a) Define the term governing of a turbine. Explain with a neat sketch governing of an impulse turbine. (10)  
(b) With a neat sketch explain the main components of the Pelton turbine (5)

- Q4** A Kaplan turbine develops 9000kW under a net head of 7.5 m. Overall efficiency of the wheel is 86%. The speed ratio based on the outer diameter is 2.2 and the flow ratio is 0.66. Diameter of the boss is 0.35 times the external diameter of the wheel. Determine the diameter of the runner and the specific speed of the runner. (15)
- Q5** (a) Define specific speed of a centrifugal pump and derive the expression for the same. (8)  
(b) Draw and discuss the characteristics curves of a centrifugal pump. (7)
- Q6** A single-acting reciprocating pump has a plunger diameter of 250 mm and stroke of 450 mm and it is driven with S.H.M at 60 r.p.m. The length and diameter of delivery pipe are 60 m and 100 mm respectively Determine the power saved in overcoming friction in the delivery pipe by fitting an air vessel on the delivery side of the pump. Assume friction factor=0.01. (15)



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