

B.Tech. (ME)**FLUID MACHINERY (ME-306)**

Time: 3 Hours

Paper ID-A0821

Maximum Marks: 60

Note: Section-A is compulsory consisting of ten questions carrying two marks each. Section-B contains five questions carrying five marks each and students have to attempt any four questions. Section-C contains three questions carrying ten marks each and students have to attempt any two questions.

SECTION-A

1. (a) Explain impulse momentum principle.
- (b) Name basic components of a turbo machine.
- (c) What do you mean by gross head and net head of turbine?
- (d) Differentiate between inward and outward radial flow turbine with neat sketches.
- (e) Define degree of reaction in turbines.
- (f) How does specific speed of a centrifugal pump differ from that of a turbine?
- (g) Define cavitation. What are the effects of cavitation?
- (h) State and explain Net Positive Suction Head.
- (i) What is an air vessel? Describe the function of the air vessel for reciprocating pumps.
- (j) Name any four hydraulic devices.

SECTION-B

2. Draw the velocity triangles for a Pelton Wheel. Prove that hydraulic efficiency of a Pelton wheel will be maximum when the velocity of the wheel is half the velocity of the jet of water at inlet.
3. What is a draft tube? Why is it used in a reaction turbine? Describe with neat sketches different types of draft tubes.
4. Two geometrically similar pumps are running at the same speed of 1000 rpm. One pump has an impeller diameter of 0.30 m and lifts water at the rate of 20 litres per second against a head of 15 m. Determine the head and impeller diameter of the other pump to deliver half the discharge.
5. For a single acting reciprocating pump draw an indicator diagram, considering the effect of acceleration and friction in suction and delivery pipes. Find an expression for the work done per second in case of single acting reciprocating pump.
6. What is hydraulic intensifier? Explain its principle and working.

SECTION-C

7. A 10 cm diameter jet having a velocity of 15 m/s strikes a flat plate normally. The plate is moving with a velocity of 6 m/s in the direction of jet and away from the jet. Find (i) the force exerted by the jet on the plate, (ii) work done by the jet on the plate per second, (iii) power of the jet in kW, and (iv) efficiency of the jet.

8. A centrifugal pump is running at 1000 rpm. The outlet vane angle of the impeller is 45° and velocity of flow at outlet is 2.5 m/s. The discharge through the pump is 200 litres per second when the pump is working against a total head of 20 m. Draw the velocity triangles for the pump. If the manometric efficiency of the pump is 80%, determine: (i) the diameter of the impeller, and (ii) the width of the impeller at outlet.

9. (a) State and explain Euler's equation for energy transfer in a turbomachine and energy transfer in terms of fluid and rotor kinetic energy changes.

(b) Explain the construction and working of axial flow pump with neat sketches.

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