

	<p style="text-align: center;">ADAMAS UNIVERSITY END-SEMESTER EXAMINATION : JANUARY 2021 (Academic Session: 2020 – 21)</p>		
Name of the Program:	B.Tech in Mechanical Engineering	Semester:	VII
Paper Title:	Fluid Machinery	Paper Code:	EME44101
Maximum Marks:	40	Time duration:	3:00 hours
Total No of questions:	8	Total No of Pages:	02
(Any other information for the student may be mentioned here)			

Answer all the Groups

Group A

Answer all the questions of the following

$5 \times 1 = 5$

1. a) What is cavitation? Explain the effect of Cavitation in Centrifugal Pump Section.
- b) What do you mean by Specific Speed of Hydraulic Turbine?
- c) What is the reason behind slip in a reciprocating pump?
- d) Differentiate between the term of Impulse and Reaction.
- e) What is Degree of Reaction? Write down the Expression of Degree of Reaction.

GROUP –B

Answer *any three* of the following

$3 \times 5 = 15$

1. A jet of water of diameter 10cm strikes a flat plate normally with a velocity of 15m/s. The plate is moving with a velocity of 6m/s in the direction of the 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.
2. A Turbine is to operate under a head of 25m at 200 r.p.m. the discharge is 9cumec. If the Efficiency is 90%, determine:
 - I) Specific Speed of the machine
 - II) Power generated
 - III) Type of Turbine
3. Why draft tube is used for any Reaction Turbine? Draw a conical draft tube and explain how net head is increased with use of draft tube
4. Explain centrifugal pump showing its major components?

GROUP –C

Answer *any two* of the following

$2 \times 10 = 20$

5. i) Derive the Expression of Maximum $\eta_{\text{Hydraulic}} = (1 + \cos\phi)/2$ for Pelton Wheel. [5]
ii) A Pelton wheel is to be designed for the following specifications:
Shaft Power=11772kW; Head=380m; Speed=750 r.p.m; Overall Efficiency=86%; Jet diameter is not to exceed one-sixth of the wheel diameter. Determine:
a) The Wheel diameter, b) The number of jets required, and c) Diameter of the jet.
Take $K_{v1}=0.985$ and $K_{u1}=0.45$ [5]
6. i) Explain with neat sketch of Main Characteristics Curve and Muschel Curve for Hydraulic Turbine. [4]
ii) An inward flow reaction turbine has external and internal diameters as 1m and 0.5m respectively. The velocity of flow through the runner is constant and is equal to 1.5m/s. Determine:
a) Discharge through the runner, and b) Width of the turbine at outlet if the width of the turbine at inlet=200mm. [6]
7. i) The internal and external diameters of the impeller of a centrifugal pump are 200mm and 400mm respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water. [5]
ii) A Double-Acting reciprocating Pump, running at 40r.p.m, is discharging 1.0m^3 of water per minute. The pump has a stroke of 400mm. The diameter of the piston is 200mm. The delivery and suction head are 20m and 5m respectively. Find the slip of the pump and power required to the pump. [5]
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