ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END-SEMESTER EXAMINATION: MAY 2021** (Academic Session: 2021 – 22)		
Name of the Program:	B.Tech in Mechanical Engineering	**Semester:**	IV
Paper Title:	Fluid Machinery	**Paper Code:**	EME42112
Maximum Marks:	40	**Time duration:**	3:00 hours
Total No of questions:	8	**Total No of Pages:**	02

Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. **a)** Draw the Layout diagram of Hydroelectric Power Plant.

   b) Discussed the classification of Turbine?

   c) What is the relation between the Mechanical Efficiency, overall efficiency & Hydraulic Efficiency of Hydraulic Turbine?

   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 $3 \times 5 = 15$

2. 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.

3. A nozzle of 50mm diameter deliver a stream of water at 20m/s perpendicular to a plate that moves away from the jet at 5m/s. determine:
   I) The force on the plate
   II) The work done &
   III) The efficiency of jet

4. 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

5. Explain centrifugal pump showing its major components?

GROUP –C

Answer *any two* of the following $2 \times 10 = 20$

6. i) Derive the Expression of Maximum $\eta_{Hydraulic} = (1+\cos\varphi)/2$ 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]

7. 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]

8. i) A water Turbine has a velocity of 6m/s at the entrance of the draft tube and a velocity of 1.2m/s at the exit. For friction losses of 0.1m & a tail water 5m below the entrance to the Draft tube. Find the pressure head at the entrance. [5]
ii) A Pelton wheel is revolving at a speed of 190r.p.m and develops 5150.25KW when working under a head of 220m with an overall efficiency of 80%. Determine unit Speed, Unit Discharge, and Unit Power. The speed ratio for the turbine is given as 0.47. Find the speed, Discharge, and Power when this turbine is working under a head of 140m. [5]
