



# ANURAG GROUP OF INSTITUTIONS

(Formerly CVSR College of engineering)

*Autonomous Institution - Accredited by NAAC with 'A' Grade & NBA,  
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## Department of Mechanical Engineering

### Mechanics of Fluid and Hydraulic Machinery

#### Assignment Test Questions II

1. Derive expression for Boundary Layer Thickness.
2. A jet of water having a velocity of 37 m/s strikes a series of radial curved vanes mounted on a wheel which is rotating at 350 rpm. The jet makes an angle of  $4^{\circ}$  with the tangent to wheel at inlet and leaves the wheel with a velocity of 3 m/s at an angle of  $12^{\circ}$  to the tangent to the wheel at outlet. Water is flowing from outward in a radial direction. The outer & inner radii of the wheel are 0.7m & 0.45m respectively. Determine (i) Vane angles at inlet & outlet  
(ii) Work done per sec per unit weight of water striking per sec  
(iii) Efficiency of the wheel.
3. The following data is related to a Pelton Wheel Turbine:  
Head at base of nozzle = 110 m  
Dia. Of jet = 7.5 cm  
Discharge of nozzle = 200 lit/sec  
Shaft power = 191.295 KW  
Power absorbed in mechanical resistance = 3.675 KW  
Determine (i) Power lost in nozzle (ii) Power lost due to hydraulic resistance in runner.
4. A Kaplan Turbine working under a head of 25m develops 16000 KW of shaft power. The outer dia. of runner is 4m & hub dia. is 2m. The guide blade angle is  $35^{\circ}$ . The hydraulic & overall efficiencies are 90% & 85% respectively. If velocity of whirl is zero at outlet, determine runner vane angles at inlet & outlet & find the speed of runner.
5. A Centrifugal Pump is running at 1300 rpm. The outlet vane angle of impeller is  $38^{\circ}$  & velocity of flow at outlet is 5.2 m/s. The pump is working against a total head of 35m & discharge through pump is  $0.6 \text{ m}^3/\text{s}$ . If manometric efficiency of pump is 83%, determine (i) dia. of impeller (ii) width of impeller at outlet.