

CEL 451

Water Power Engineering

Time: 1 hour Time: 9.30-10.30AM Room No. LH-316 Total Marks: 20
Assume any Missing Data No Extra Time is allowed **Submit on Time**

1. Explain the flow duration curve and its role in the power generation. Also briefly explain hydropower plant based on hydraulic features and plant capacity. [Marks=6]
2. A pelton wheel is to be designed for a head of 60m when running at 200r.p.m. The pelton wheel develops 95.6475kW of shaft power. The velocity of buckets is 0.45 times the velocity of the jet, overall efficiency is found to be 0.85 and the coefficient of velocity can be taken as equal to 0.98. [Marks=4]
3. The following data is given for a Francis Turbine: Net Head = 60m, speed = 700r.p.m, shaft power=294.3kW, overall efficiency =84%, Hydraulic efficiency =93%, flow ratio=0.2, $B_1/D_1=0.1$, outer diameter of the runner = two times of inner diameter. The thickness of the vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine: (i) Guide blade angel (ii) Runner vane angles at inlet and outlet (iii) Diameter of runner at inlet and outlet. [Marks=6]
4. Write the differences (1/2 marks in each point)
 - (a) Pelton wheel and Francis Turbine
 - (b) Divided Plant and Concentrate Plant[Marks=4]