GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI
DEPARTMENT OF MECHANICAL ENGINEERING

Subject: Hydraulic Machine [MEU505]

Class Test: 2 — Max. Marks: 15

Time: 1 Hr. — Date: 26th Sept., 2018

Note: 1. Solve any **three** questions.
2. All questions carry equal marks.
3. Assume suitable data whenever necessary.

Q.1 Explain in details working of Pelton Turbine with neat sketch. Also explain the various efficiencies of the turbine. **[5]**

Q.2 Define Degree of Reaction. By using fundamental equation of hydrodynamic machine derive an expression for degree of reaction of actual reaction turbine. **[5]**

Q.3 The following data pertaining to Pelton Turbine:

Gross Head: 400m — Diameter of jet= 0.08m

Diameter of penstock= 0.6m — Length of penstock= 4000m

Angle of deflection= 165° — Speed ratio= 0.48

Friction factor (f) = 0.008 — Coefficient of Velocity=0.97

Relative velocity at outlet= 0.85 times relative velocity at inlet

Mechanical Efficiency= 90%

Find: The flow rate and shaft power developed by the turbine. **[5]**

Q.4 The following data is given for a Francis turbine.

Net head=70 m, Speed =600 rpm, Shaft Power= 368 kW, Overall efficiency=85%, Hydraulic efficiency = 95%, Flow ratio= 0.25, Breadth ratio=0.1, OD of the runner= 2 times ID of the runner. The thickness of the vanes occupies 10% of circumferential area of the runner, velocity of the flow is constant at inlet and outlet, Discharge is radial at outlet.

Determine: a) Guide blade angle, b) Runner vane angle at inlet and outlet, c) Diameters of runner at inlet and outlet, d) Width of the wheel at inlet. **[5]**

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