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TEST -2 EXAMINATION- Oct 2017

7th Semester (Civil Engineering)

Course Code: 10B1WCE732

Max. Marks: 25

Course Name: Hydropower Engineering

Max. Time: 1 hr & 30 min

Course Credit: 3

Note: All questions are compulsory. Assume suitable data if required. Notation has their usual meanings.

- Q1. (a) Explain the different types of efficiency of a turbine. [2]
(b) Differentiate between Kaplan and Propeller turbines. [1]
(c) Briefly explain the utility of Unit quantities. [1]
- Q2. Describe briefly the function of various components of Inward flow reaction turbine with sketch. [3]
- Q3. Define specific speed of a turbine? Derive an expression for the specific speed. [1+3]
- Q4. A conical draft tube having diameter at the top as 2.0 m and pressure head at 7 m of water (vacuum), discharges water at the outlet with a velocity of 1.2 m/s at the rate of $25\text{m}^3/\text{s}$. If the atmospheric head is 10.3 m of water and losses between the inlet and outlet of the draft tubes are negligible, find the length of draft tube immersed in water. Total length of tube is 5 m. [4]
- Q5. Water enters an inward flow turbine at an angle of 22° to the wheel tangent to the outer rim and leaves the turbine radially. As the speed of the wheel 300 rpm and the velocity of flow is constt at 3 m/sec, find the necessary angles of the blades when the inner and outer diameter of the turbine are 30 cm and 60 cm. if the width of the wheel at inlet is 15 cm, calculate the power developed. The thickness of the blade may be neglected [5]
- Q6. The runner of a Kaplan turbine is 4 m in diameter and the boss is 2 m in diameter. The turbine works under a head of 22 m and develops 19000 hp. The overall efficiency is 85% and the hydraulic efficiency is 90%. At the extreme edge of the runner if the guide blade angle is 40° , find the runner vane angles at inlet and outlet at the extreme edge of the runner, find also the speed of the turbine. Assume that the discharge is radial at outlet. [5]