Experimental investigation of performance characteristics for laboratory scale kaplan turbine rig

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During the operation, a turbine is normally required to operate under different conditions of head, speed, discharge, power output and guide vane openings. This way it becomes necessary to conduct performance test for understanding the behavior under different conditions. Laboratory guideline, parts and measurement devices for the Kaplan turbine rig located at the Department of Mechanical and Industrial Engineering were missing. As recommended by turbine testing standard IS and IEC (1991) standards, experiments were carried out on the Kaplan turbine rig under constant head condition with varying guide vane opening. Speed was varied by controlling opening of guide vanes. The shaft power was then measured mechanically by rope brake dynamometer and the discharge was recorded by using venturimeter reading. From experimental results obtained, main characteristics curves were drawn. It was observed that at full opening of the guide vanes, the discharge recorded was0.026 m3/s at a speed of 610.5 rpm compared to discharge of0.029 m3/s at a speed of 1017.5 rpm. At full opening of the guide vanes, shaft power increases from 290 W at288.5 rpm to 469 W at 610.5 rpm before decreasing to 103.5Wat1017.5 rpm. At turbine rotational speed of 610.5 rpm and mass loading of 6.8 kg, maximum efficiency was 50.2 % at full guide vane opening. From this research the existing Kaplan turbine ring back into normal operational status and its performance characteristics has been investigated for learning activities.