

Class test 2

Time: 1 hour 30 minutes Full Marks 30

1. The blade velocity in an axial flow turbine is 125 m/s. The blade angles at the inlet and outlet are 140° and 25° respectively. The absolute fluid velocity at the inlet is 220 m/s. The relative velocity at the outlet is 50% more than that at the inlet due to expansion. Calculate the angle at which the fluid enters the rotor, specific work, degree of reaction, utilization factor and axial thrust.
- 2x5=10**
2. Air enters a radial flow compressor with a velocity of 50 m/s, without any whirl component. The diameters of the rotor are 30 cm and 60 cm at the inlet and outlet, respectively. The blades are radial at the outlet. Calculate the blade angle, speed of the rotor, and the degree of reaction if the specific work of the rotor is 30 kJ/kg. The flow component of velocity remains constant in the rotor.
- 4+3+3=10**
3. The runner of an inward flow turbine has a diameter of 75 cm at the inlet. The speed of the rotor is 500 rpm. Water enters the turbine at an angle of 28° . The velocity of flow gets reduced to 75% due to the variation of area in the rotor. The water gets discharged without any whirl component at a rotor diameter of 30 cm. The blade outlet angle is 55° . The losses in the runner are 15%. Find the velocity of water at the inlet, the inlet blade angle, the specific work output, the degree of reaction, and the utilization factor.