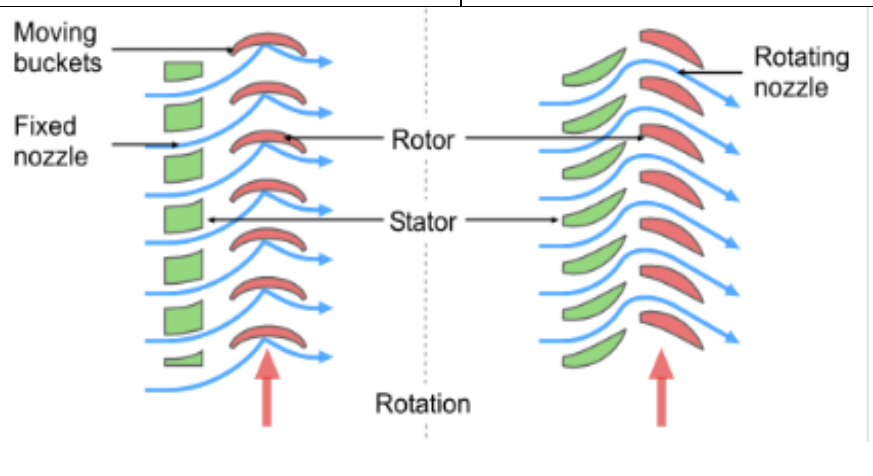
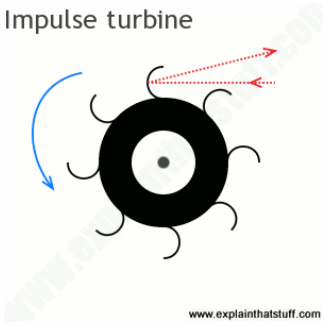
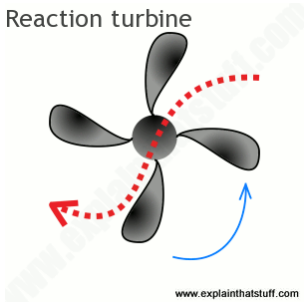
Q4) Describe the operation of reaction turbine blades and explain the differences between pure impulse and reaction blades from the various points of view such as shape, location, efficiency, etc.

A reaction turbine develops torque by reacting to the pressure or weight of a fluid and its operation is described by Newton's third law of motion (action and reaction are equal and opposite).In a reaction turbine, the nozzles that discharge the working fluid are attached to the rotor. The acceleration of the fluid leaving the nozzles produces a reaction force on the pipes, causing the rotor to move in the opposite direction to that of the fluid (so it takes reaction not action of fluid pressure). As flow goes through the nozzle and rotor rows, the flow's static pressure is continually decreasing. Some of that drop in static pressure takes place in the nozzle row, and most takes place in the rotor row. It so happens that pressure decreases that happen in the rotor row are referred to as 'reaction'

	Impulse Turbine	Reaction Turbine
General Description	In impulse turbines, number of elliptical half sized buckets are fitted instead of blades on the rotor hub. When water strike the buckets at high speed, the rotor starts rotating. In short, the kinetic energy of water gets converted into rotational mechanical energy	The turbine blades or the impeller blades are designed in such a way that a force is generated on one side when water flows through it just like an airfoil. The force produced by airfoil is responsible for lift of aeroplane. Similarly here, that force makes the blades rotate.
		

The Flow	In an impulse turbine, a fast-moving fluid is fired through a narrow nozzle at the turbine blades to make them spin around. The blades of an impulse turbine are usually bucket-shaped so they catch the fluid and direct it off at an angle or sometimes even back the way it came (because that gives the most efficient transfer of energy from the fluid to the turbine). In an impulse turbine, the fluid is forced to hit the turbine at high speed. 	In a reaction turbine, the blades sit in a much larger volume of fluid and turn around as the fluid flows past them. A reaction turbine doesn't change the direction of the fluid flow as drastically as an impulse turbine: it simply spins as the fluid pushes through and past its blades. Wind turbines are perhaps the most familiar examples of reaction turbines. 
Efficiency (For same flow rate and operating conditions)	Low	High
Size	Very less	High
Cost (For Same Power Rating)	Lower	Much Higher
Common Applications	Widely used in petrochemical and refineries	Widely used in Power plants.