GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2018

Subject Code:2151903   Date:16/11/2018

Subject Name:Fluid Power Engineering

Time: 10:30 AM TO 01:00 PM   Total Marks: 70

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	(a)	Draw general layout mentioning essential components of hydro power plant.	03
	(b)	Explain following terms: Hydraulic efficiency and Priming.	04
	(c)	Prove that the velocity of the curved symmetric moving plate is one third of jet velocity for maximum efficiency when jet strikes at the center of curved plate.	07
Q.2	(a)	Compare impulse and reaction hydraulic turbines.	03
	(b)	Explain principle of jet propulsion.	04
	(c)	A jet of water having a velocity of 15 m/sec strikes a curved vane which is moving with a velocity of 5 m/s in the same direction as that of jet at inlet. The vane is so shaped that the jet is deflected through 135°. Diameter of the jet is 100 mm. Assuming the vane to be smooth, find (i) force exerted by the jet on the vane in the direction of motion (ii) work done (iii) efficiency. Assume symmetrical balde.	07

OR

			MARKS
	(c)	Explain phenomenon of surging and stalling in an axial flow compressor with neat sketch.	07
Q.3	(a)	List factors affecting performance of hydraulic turbine and draw main characteristic curve of impulse turbine.	03
	(b)	Explain with neat sketch the functions of main components of Pelton turbine.	04
	(c)	A Kaplan turbine develops 6000 kW power with a head of 5 m. Hub diameter of runner is 0.33 times the outer diameter of runner. Find the diameter of the runner, rotational speed of turbine. Take the speed ratio 2.5, flow ratio 0.6 and overall efficiency 90%.	07

OR

			MARKS
Q.3	(a)	What is draft tube? Where and why it is used?	03
	(b)	Define and explain significance of unit quantities for hydraulic turbine.	04
	(c)	A Pelton wheel is to be designed for following specifications: shaft power = 11800kW, Head = 400m, Speed = 700 rpm, Overall efficiency = 85%, jet diameter is not to exceed one sixth of the wheel diameter. Determine wheel diameter, number of jet required and diameter of the jet. Take coefficient of velocity = 0.98 and speed ratio =0.45.	07
Q.4	(a)	Define different efficiencies of centrifugal pump.	03
	(b)	What is cavitation? What are its effects?	04

(c) A centrifugal pump is running at 1000 rpm. The outer vane angle of the impeller is 45° and velocity of flow at outlet is 2.5 m/s. The discharge through the pump is 200 liters/s when the pump is working against a total head of 20 m. if the manometric efficiency of the pump is 80 %, determine diameter of impeller and width of impeller at outlet. **07**

<div align="center">OR</div>

Q.4	**(a)**	Explain needs of air vessels. Where are they located?	**03**
	(b)	Why multi staging is required in reciprocating air compressor? What are its advantages?	**04**
	(c)	Explain the effect of blade shape of impellers on performance of Centrifugal compressor. Also classify the blades based on curvature.	**07**
Q.5	**(a)**	Define: slip factor, isentropic efficiency and work input factor.	**03**
	(b)	What is pre - whirl? Explain the effect of Pre-whirl in centrifugal compressor.	**04**
	(c)	Explain with neat sketch Hydraulic Ram.	**07**

<div align="center">OR</div>

Q.5	**(a)**	Explain working principle of hydraulic intensifier.	**03**
	(b)	A jet of water having a velocity 20 m/s strikes on a series of vanes moving with a velocity 8 m/s. the jet makes an angle of 30° with the direction of motion of vanes when entering and leaves at an angle of 150° with the direction of motion. Sketch velocity triangle and measure inlet and outlet vane angles.	**04**
	(c)	Explain hydraulic torque converter with neat sketch	**07**

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