Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER – IV • EXAMINATION – WINTER 2012

Subject code: X 41902 Date: 27/12/2012

Subject Name: Fluid Power Engineering

Time: 02.30 pm - 05.00 pm Total Marks: 70

Instructions:

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

Q.1	**(a)**	Sketch Hydro power plant and explain it's different parts.	**07**
	(b)	A Pelton wheel has mean bucket diameter of 1m and it runs at 1000 rpm. The neat head is 700m and side clearance angle is 15^0.The discharge through nozzle is 0.1 m^3 /sec then find (i) Power available at the nozzle and (ii) Hydraulic efficiency of the turbine.	**07**
Q.2	**(a)**	Derive Darcy-Weisbach formula for head loss due to frication in the pipe.	**07**
	(b)	A horizontal pipe of diameter 400mm is suddenly contracted to a diameter of 200mm. The pressure intensities in the large and smaller pipe is given as 140 kN/m^2 and 120 kN/m^2 respectively. If the rate of flow of water is 200 litres/s, find the value of co-efficient of contraction C_c **OR**	**07**
	(b)	What is Specific speed obtain the expression for the specific speed of hydraulic turbine.	**07**
Q.3	**(a)**	State the main components of the Centrifugal pump and and explain working with neat sketch.	**07**
	(b)	A centrifugal pump runs at 500 rpm and discharges 8 m^3 /min against head of 10m. It has an impeller of 50cm outer diameter and 25cm inner diameter. Vanes are set back at outlet at an angle of 45^0 . The constant velocity of flow is 2 m/s. Find (i) The manometric efficiency and (ii) Vane angle at inlet.	**07**
Q.3	**(a)**	Classify the Reciprocating pump and explain working of single stage Reciprocation pump with neat sketch.	**07**
	(b)	Draw and explain the Main characteristic curve of Centrifugal pump.	**07**
Q.4	**(a)**	Derive formula for workdone/kg of air in single stage reciprocating compressor without clearance.	**07**
	(b)	A single cylinder single acting reciprocating air compressor is driven by 25 kw electric motor. It takes air at 1.013 bar and 18^0 temp.and delivers it at 8 bar. Compressor runs at 300 rpm. The index of compression and expansion is 1.32 and the clearance volume is 6% of swept volume. Assuming the mechanical efficiency as 85% and bore is equal to stroke, Find the free air delivered in m^3/ min, the volumetric efficiency and the bore and stroke of the compressor.	**07**
		OR	
Q.4	**(a)**	Draw and explain the Scroll compressor and Explain it's working principle with required sketch.	**07**
Q.4	**(b)**	Write shot note on the Root blowers.	**07**
Q.5	**(a)**	Derive an expression for the force exerted by a jet of water on the fixed inclined plate moving in a direction of jet.	**07**
	(b)	A jet of water from a nozzle is deflected thorough 50^0 from it's original direction by a curved plate, the jet enters tangentially without sock with a velocity of 25 m/s and leaves with velocity of 20m/s Find the magnitude and direction of the resultant force on vane when vane is stationary and mass flow of jet is 1 kg/s.	**07**
		OR	
Q.5	**(a)**	Explain fully "Pre-whirl" in centrifugal compressor.	**07**
	(b)	What is stage in the Axial flow compressor explain stage velocity triangle and combined velocity diagram.	**07**

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