Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER IV– • EXAMINATION – SUMMER 2015

Subject Code:X41902 **Date:30/05/2015**

Subject Name:Fluid Power Engineering

Time:10.30am-01.00pm **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)** Draw and explain Hydro-electric Power Plant with neat sketch. **07**

(b) A three jet Pelton wheel generates 10000kw under head of 400m. The blade angle at outlet is 15^0 and the reduction of relative velocity while passing through blade is 5%. The overall efficiency of wheel is 80%. C_v=0.98 and speed ratio = 0.46 Find **07**

1. Total flow in m^3/sec and
2. The diameter of jet.

Q.2 **(a)** State the main components of the Centrifugal pump and explain working with neat sketch. **07**

(b) A centrifugal pump runs at 500rpm and discharges 8 m^3/min against head of 10m. It has impeller of 50cm outer diameter and 25cm inner diameter. Vanes are set back at outlet angle of 45^0. The constant velocity flow is 2 m/s. **07**

Calculate:

1. The manometric efficiency
2. Vane angle at inlet.

OR

(b) What is Specific speed obtain the expression for the specific speed of hydraulic turbine. **07**

Q.3 **(a)** Classify the energy losses in the pipe. Explain the Chezy's formula. **07**

(b) A water tank 4 km away from the college hostel. Water supplies 150 litres per student per day. The strength of student is 1000. The total water required is pumped to tank at night for 6 hours. Calculate the diameter of pipe when head loss is limited to 25m. Assume f=0.0018. **07**

OR

Q.3 **(a)** Give classification of Reciprocating pump. Draw neat sketch of single acting reciprocating pump. **07**

(b) Write short note on Jet pump. **07**

Q.4 **(a)** Derive formula for workdone/kg of air in single stage reciprocating compressor without clearance. **07**

(b) A single stage, single acting Reciprocating compressor has clearance volume is 5% of the swept volume.Air drawn at 0.95bar and 27^0. The delivery pressure is 7 bar. The atmospheric conditions are 1.013bar and 17^0. The index of compression or expansion is 1.3. Find **07**

1. Indicated power when 3.5m^3/min of free air delivered.
2. Volumetric efficiency and
3. Volumetric efficiency to free air delivered.

OR

Q.4 **(a)** Give detail classification of rotary compressor and explain any one with line sketch **07**

	(b)	Explain fully “Pre-whirl” in centrifugal compressor.	**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 of diameter of 7.5cm moving with a velocity of 30 m/s, strikes a curved fixed plate tangentially at one end at an angle of 30^0 to the horizontal. The jet leaves plate at angle of 20^0 to the horizontal. Find the force exerted by the jet on plate in the horizontal and vertical direction.	**07**

OR

Q.5	**(a)**	With a suitable sketch explain the working principle of an axial flow compressor. Draw the stage velocity triangles.	**07**
	(b)	Derive an expression for the optimum value of the intercooler pressure in a two stage reciprocating air compressor for perfect inter cooling condition.	**07**

****