

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-V EXAMINATION – WINTER 2015**

**Subject Code: 151903****Date:08/12/2015****Subject Name: Fluid Power Engineering****Time: 10:30am to 1:00pm****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)** The following aspects relate to a Pelton turbine: head 72m, speed of wheel 240 rpm, shaft power of wheel 115 k W, speed ratio 0.45, coefficient of velocity 0.98, overall efficiency 85%. Determine diameter of wheel, diameter of jet, size of buckets, and number of buckets on wheel. **07**
- (b)** Differentiate between the following **07**
1. Impulse turbine and reaction turbine.
  2. Reciprocating pump and centrifugal pump.
- Q.2 (a)** Explain the following terms: Cavitation, Multistage pumps, air vessels, priming. **07**
- (b)** Explain how hydraulic turbines are classified. **07**
- OR**
- (b)** Show that the efficiency of propulsion when inlet orifices face the direction of motion of a ship is given by  $\eta = 2u / (v + 2u)$ , where v is absolute velocity of issuing jet and u is velocity of ship. **07**
- Q.3 (a)** Classify air compressors and state application and uses of compressed air. **07**
- (b)** What do you mean by multistage compression? What are its merits over single stage compression? **07**
- OR**
- Q.3 (a)** A centrifugal compressor delivers free air at 18 kg/min, air is sucked at static states of 1 bar, 27 °C with inlet velocity of 50 m/s. The total head pressure ratio is 4 and isentropic efficiency of compressor is 75%, mechanical efficiency of motor attached to it is 90%. Determine total head temperature of air at exit of compressor and brake power required to drive the compressor. **07**
- (b)** Explain the phenomena of surging and choking in centrifugal compressor. **07**
- Q.4 (a)** With neat sketch explain construction and working of hydraulic press. **07**
- (b)** Write short note on “Hydraulic jack,” **07**
- OR**
- Q.4 (a)** Write short note on “Fluid couplings” **07**
- (b)** A hydraulic press has a ram of 180 mm diameter and a plunger of 36 mm diameter; with stroke length of 300 mm. Weight exerted by press ram amounts to 7KN and distance moved is 0.9m in 15 minutes. Determine, force applied on plunger, number of strokes performed by plunger, work done by press ram and power required to drive the plunger. **07**
- Q.5 (a)** With usual notation derive general equation for heat loss due to sudden enlargement. **07**

- (b) The diameter of a horizontal pipe which is 300 mm is suddenly enlarged to 600 mm. The rate of flow of water through this pipe is  $0.4 \text{ m}^3/\text{sec}$ . If the intensity of pressure in smaller pipe is  $125 \text{ KN}/\text{m}^2$  determine: **07**
1. Loss of head due to sudden enlargement
  2. Power lost due to enlargement.

**OR**

- Q.5** (a) With usual notations derive Darcy-Weisbach formula for calculating friction losses in pipes. **07**
- (b) Explain general lay out and essential components of hydro power plant. **07**

\*\*\*\*\*