



- (a)  $D$  (b)  $D^2$  (c)  $D^3$  (d)  $1/D^3$
- j) The positive displacement compressor is \_\_\_\_\_
- (a) Roots blower compressor  
 (b) Centrifugal compressor  
 (c) Vane blower compressor  
 (d) Both A and C
- k) Rotary compressor is best suited for \_\_\_\_\_
- (a) Large quantity of air at high pressure  
 (b) Small quantity of air at high pressure  
 (c) Small quantity of air at low pressure  
 (d) Large quantity of air at low pressure
- l) The ratio of actual whirl velocity to the ideal whirl velocity in the centrifugal compressor is called as \_\_\_\_\_.  
 (a) velocity factor (b) slip factor  
 (c) work factor (d) none of the above
- m) Which fluid is used in hydraulic power systems?  
 (a) water (b) oil (c) non-compressible fluid (d) all the above
- n) The underlying principle behind a hydraulic press is based on \_\_\_\_\_ principle  
 (a) Bramah's (b) Pascal's (c) Stoke's (d) Newton's

**Attempt any four questions from Q-2 to Q-8**

**Q-2 Attempt all questions (14)**

- (a) How ships are propelled? Derive an expression for propulsive work and propulsive efficiency if the water is drawn from an orifice at right angles to the motion of ship.
- (b) A jet of water of 30 mm diameter, strikes on the hinged rectangular plate weight 100 N at the center of the plate. The velocity of the jet is 8 m/s. Calculate:  
 (1) Angle through which the plate will swing, and  
 (2) Force must be applied at the lower edge of the plate in order to keep the plate vertical.

**Q-3 Attempt all questions (14)**

- (a) What is a draft tube? Why is it used in a reaction turbine? What are the various types of it?
- (b) A Pelton turbine is to be designed for following specifications:  
 Shaft power = 11770KW, Head = 380m, speed = 750rpm, overall efficiency = 86%, jet diameter not to exceed one sixth of wheel diameter. Determine the wheel diameter, number of jets required, diameter of jet. assume  $C_v = 0.985$ ,  $v = 0.45(2gH)^{0.5}$

**Q-4 Attempt all questions (05)**

- (a) Compare Francis turbine with Kaplan turbine. (05)
- (b) What is cavitation? What are its causes? How it can be prevented in centrifugal pump. (05)



- (c) How are hydraulic turbines classified? (04)
- Q-5 Attempt all questions (14)**
- (a) Derive expression for minimum speed for starting a centrifugal pump.
- (b) A double acting reciprocating pump running at 50rpm, delivers 40 litres per seconds has following specifications: Piston diameter=300mm, Poston rod diameter = 50mm, Storke= 400mm, Suction head= 4m, Delivery head= 8m.  
Calculate (i) Slip (ii) Force required to operate the pump during forward and reverse stroke of piston. (iii) Power required to drive the pump.
- Q-6 Attempt all questions (14)**
- (a) Justify the need for multistage in a reciprocating air compressor. List any two advantages of multistage compression.
- (b) Give Comparison between  
(i) Reciprocating compressor and Centrifugal compressor.  
(ii) Centrifugal compressor and Axial compressor.
- Q-7 Attempt all questions (14)**
- (a) Derive the condition for minimum work input for a two stage reciprocating compressor  $P_2 = (P_1 * P_3)^{1/2}$
- (b) What is pre-whirl? Sketch the velocity diagrams with and without pre whirl for a centrifugal compressor.
- Q-8 Attempt all questions**
- (a) Write a short note on Hydraulic Crane with neat sketch. (05)
- (b) Describe the working of a Hydraulic Ram with neat sketch. (05)
- (c) Write a short note on Fluid torque converter. (04)

