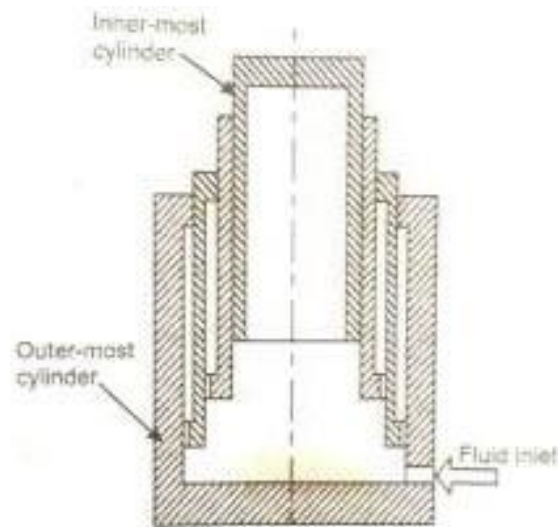

When the cylinder piston is actuated, the fluid enters the cylinder port and flows through the little check valve so that the entire piston area can be utilized to produce force and motion. For the prevention of shock due to stopping loads at the end of the piston stroke, cushion devices are used. Cushions may be applied at either end or both ends. They operate on the principle that as the cylinder piston approaches the end of stroke, an exhaust fluid is forced to go through an adjustable needle valve that is set to control the escaping fluid at a given rate. This allows the deceleration characteristics to be adjusted for different loads.

TELESCOPIC CYINDERS:



It has multiple cylinders that are mounted concentrically one within the other. The design is such that the inner most cylinder extends first, while the next cylinder extends after completion of the full stroke of the cylinder. Thus, each cylinder extends in stage, one after the other. Each stage of the cylinder has a sleeve that fits into the previous stage of the cylinder. The total stroke length achieved will be sum of the strokes of all the stages.

QUESTIONS FROM PREVIOUS YEAR QUESTION PAPERS:

DEC 2015/JAN 2016

- 1) Explain the working and design of a vane pump.
- 2) A pump has a displacement volume of 120cm^3 . It delivers $1.5 \times 10^{-3} \text{ m}^3/\text{s}$ at 1440RPM and 60bar. If the prime mover input torque is 130 N-m and overall efficiency 88%, find theoretical discharge of the pump, volumetric efficiency of the pump, mechanical efficiency of the pump, overall efficiency.
- 3) A pump supplies oil at $0.0016 \text{ m}^3/\text{s}$ at a 40mm diameter double acting hydraulic cylinder. If the load is 500N and the rod dia is 20mm, find i) cylinder power during extension stroke ii) cylinder power during retraction stroke iii) pressure during extension and retraction stroke iv) piston velocity during extension and retraction stroke.

JUNE/JULY 2016

- 1) Explain the construction and working of an external gear pump.
- 2) Determine the volumetric efficiency of a gear pump of external diameter and internal diameter of gears 75mm and 50mm respectively and width of gear teeth 50mm, if the actual discharge is 30LPM at 1800rpm. [LPM = Litres per minute]
- 3) Sketch and explain double acting cylinder.

DEC 2016/JAN 2017

- 1) Explain the working of unbalanced vane pump. Also obtain an expression for its theoretical discharge.
 - 2) A pump having a displacement of 25cm^3 , operates with a pressure of 250bar and speed of 1390rpm. Volumetric efficiency of 0.85 and mechanical efficiency of 0.80. calculate i) pump delivery in LPM ii) input power at pump shaft in KW iii) Drive Torque at pump shaft
 - 3) An 8cm diameter hydraulic cylinder has 4cm diameter rod. If the cylinder receives the flow at 100LPM and 12Mpa. Find i) extension and retraction speeds ii) extension and retraction load carrying capacities.
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JUNE/JULY 2017

- 1) With neat sketch explain the construction and working of a gear pump.
- 2) Determine the volumetric efficiency of a gear pump of external and internal diameters 75mm and 50mm respectively. Width of the gear teeth is 50mm. if the actual discharge is $30 \times 10^{-3} \text{ m}^3/\text{min}$ at 1800rpm.
- 3) With a neat sketch explain the working of linear actuator for single acting cylinder.

DEC 2017/JAN 2018

- 1) A gear pump has a 75mm outside diameter, a 50mm inside diameter and a 25mm width. If the volumetric efficiency is 90% at rated pressure, what is the corresponding actual flow rate? The pump speed is 1000rpm.
- 2) A pump has a displacement volume of 100 cm^3 . It delivers $0.0015 \text{ m}^3/\text{s}$ at 1000rpm and 70bars. If the prime mover input torque is 120N-m. Determine
 - i) What is the overall efficiency of the pump?
 - ii) What is the theoretical torque required to operate the pump?
- 3) A pump supplies oil at 75.8 litres/min to a 50.8mm diameter double-acting hydraulic cylinder. If the load is 4448 N (extending and retracting) and the rod diameter is 25.4mm, find
 - i) The hydraulic pressure during the extension and retraction stroke
 - ii) The piston velocity during the extension and retraction stroke
 - iii) The cylinder power during extension and retraction stroke
- 4) Explain with a neat sketch a Gear Pump.

JUNE/JULY 2018

- 1) With a neat diagram, explain the working principle of a typical hydraulic gear pump.
- 2) What is actuator? State its broad classification.
- 3) Explain the following single acting cylinders with neat sketches.
 - i) Gravity Type
 - ii) Spring Type
 - iii) Telescopic
 - iv) Tandem

CRASH COURSE – MAY 2017

- 1) What is the pressure compensated vane pump? How does it work? Explain with neat sketch.
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- 2) A pump supplies oil at $0.0016\text{m}^3/\text{s}$ to a 40mm double acting hydraulic cylinder. If the load is 5000N (extending and retracted) and the rod diameter is 20mm, find the hydraulic pressure during extension and retraction stroke, piston velocity during extension and retraction stroke, cylinder power during the extension and retraction stroke.

ONE TIME EXIT SCHEME – APRIL 2018

- 1) Give the classification of pumps. With a neat sketch explain swash plate type piston pump.
- 2) A pump has a displacement of 98.4cm^3 . It delivers $0.00152\text{ m}^3/\text{s}$ of oil at 1000rpm and 70bar. If the prime mover input torque is 124.3N-m. Find i) Overall efficiency of pump; ii) theoretical torque required to operate the pump.
- 3) With a neat sketch, explain external gear pump.
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