



College of Engineering & Technology

Department: Mechanical Engineering
Lecturer: Dr. Rola Afify
Course Code: ME464

Marks: 15
Time: 3:15 – 4:10
Date: 1/4/2014

Name: **Model Answer**

R.N.:

Answer the following questions:

Question one (4 marks)

What are the advantages of Positive Displacement Pumps over Non- Positive Displacement Pumps?

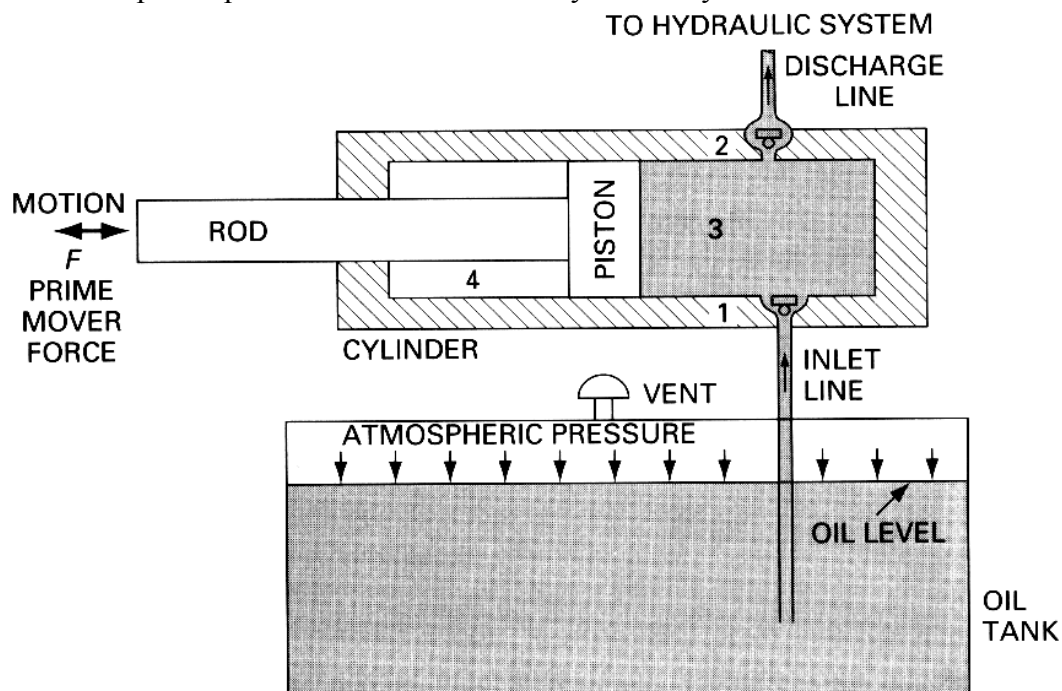
Positive Pumps have the following Advantages over Non-Positive Pumps:

- High-Pressure Capability (up to 12,000 psi)
- Small, Compact Size
- High Volumetric Efficiency
- Small Changes in Efficiency throughout the design pressure range
- Great Flexibility of Performance

Question two (3 marks)

Explain pump theory. Give an example.

A Pump, which is the Heart of a Hydraulic System, converts Mechanical Energy into Hydraulic Energy. The Mechanical Energy is delivered to the Pump via a Prime Mover such as an Electric Motor. Due to Mechanical Action, the Pump Creates a Partial Vacuum at its Inlet. This permits Atmospheric Pressure to Force the Fluid through the inlet line and into the Pump. The Pump then pushes the Fluid into the Hydraulic System. As shown

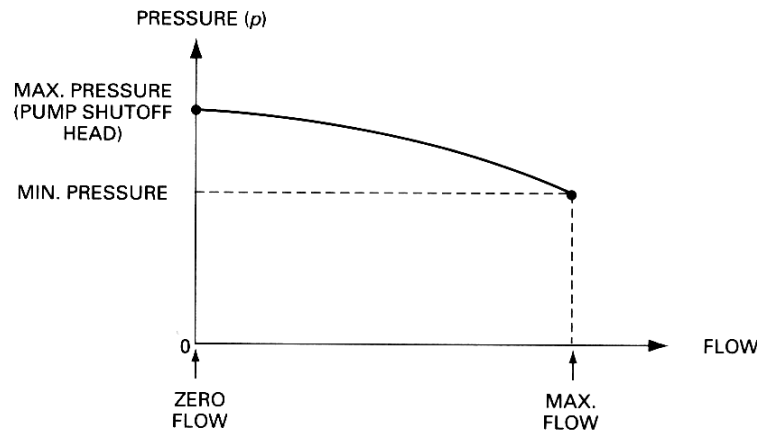
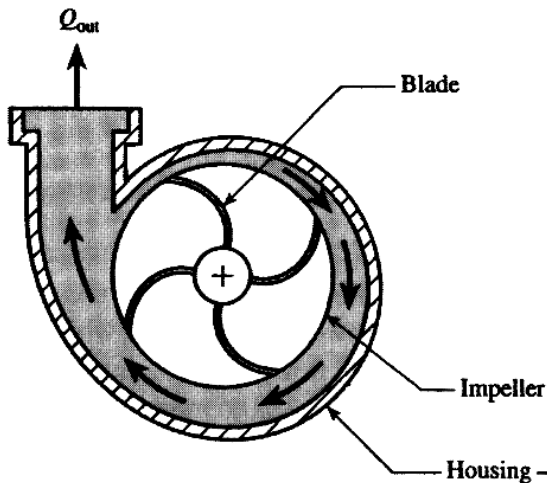


Question three (8 marks)

Compare between Centrifugal pump and External Gear Pump according to their type, schematic, operation, and pressure-flow curve using neat sketches.

Centrifugal pump

Non-positive displacement pump

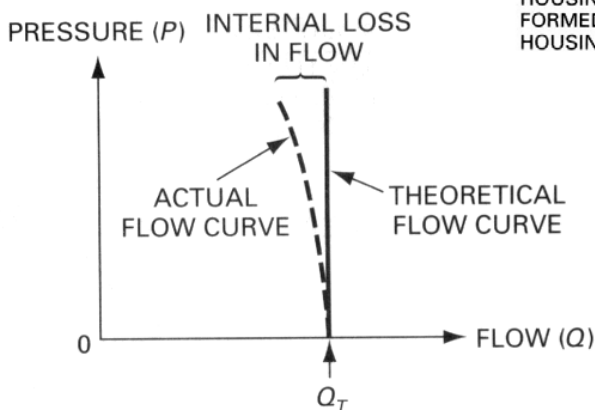
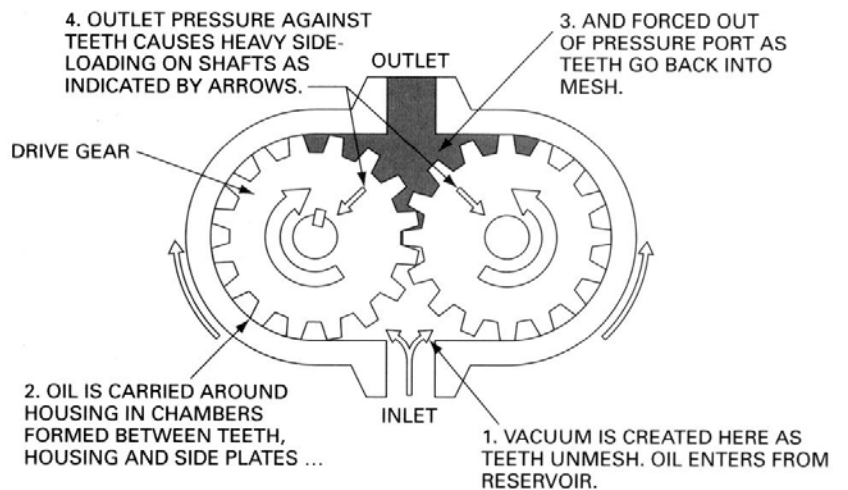


The Fluid enters at the center of the impeller and is picked up by the Rotating Impeller. As the Fluid rotates with the Impeller, the Centrifugal Force causes the Fluid to move radially outward. This causes the fluid to flow through the outlet discharge port of the housing. No Need for a Pressure Relief Valve to Prevent Pump Damage.

External Gear Pump

Positive displacement pump

External Gear Pump develops Flow by Carrying Fluid between the Teeth of Two Meshing Gears. One of the Gears is connected to a Drive Shaft connected to the Prime Mover. The Second Gear is driven as it meshes with the Driver Gear.



(b) FLOW VERSUS PRESSURE CURVE AT CONSTANT PUMP SPEED

Model Answer
Dr. Rola Afify