



College of Engineering & Technology

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

Marks: 20
 Time: 11:00 – 12:10
 Date: 30/4/2013

Name: **Model Answer**

Answer the following questions:

Question one (5 marks)

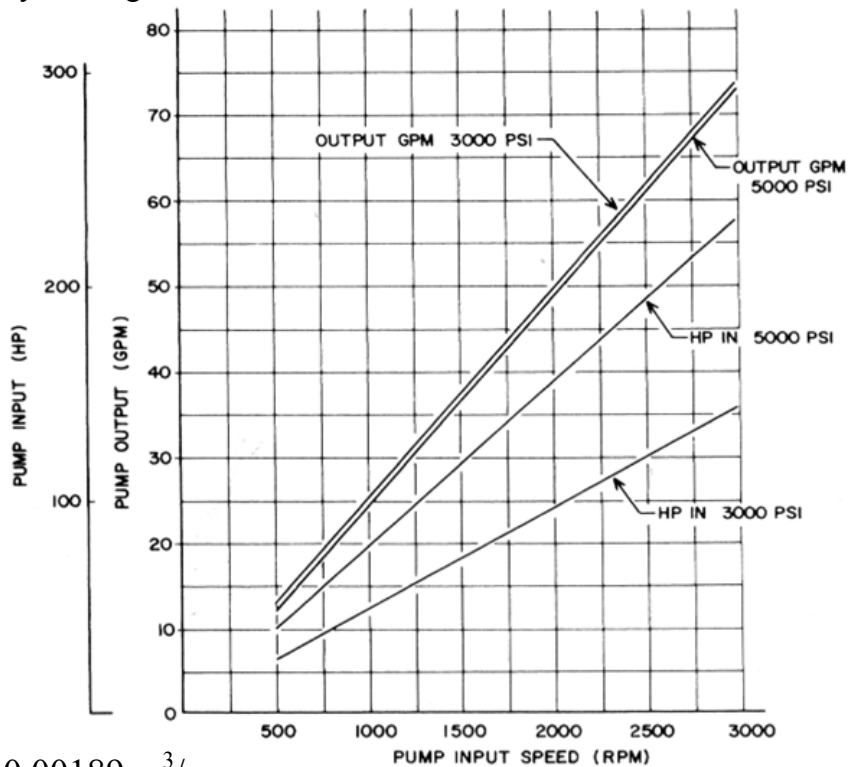
What are the benefits of using universal alignment mounting accessory components?

1. Free Range of Mounting Positions
2. Reduced Cylinder Binding and Side Loading
3. Allowance for Universal Swivel
4. Reduced Bearing and Tube wear
5. Elimination of Pston Blow-By caused by Misalignment

Question two (10 marks)

The shown graph gives the pump input horsepower (hp), and pump output flow (gpm) as a function of Pump speed, for pressure level of 5000 psi. The volumetric displacement of the pump is 6 in³/rev.

- i- Calculate the volumetric efficiency at the pressure level, at input power of 100 hp.
- ii- Calculate the mechanical efficiency at the pressure level, at 2000 rpm.



i- volumetric Efficiency= Q_A / Q_{th}

$$Q_{th} = V_D \times RPM$$

$$V_D = 6 \text{ in}^3/\text{rev}$$

From the graph at 100 hp:

$$RPM = 1250$$

$$Q_A = 30 \text{ gpm} = 30 \times 3.78 \times 10^{-3} / 60 = 0.00189 \text{ m}^3/\text{s}$$

$$Q_{th} = 6 \times 1250 \times (2.54 \times 10^{-2})^3 / 60 = 0.002 \text{ m}^3/\text{s}$$

$$\text{volumetric Efficiency} = 0.00189 / 0.002 = 0.945$$

ii- From the graph at 2000 RPM:

$$hp = 156 \text{ hp}$$

$$Q_{th} = 6 \times 2000 \times (2.54 \times 10^{-2})^3 / 60 = 0.00327 \text{ m}^3/\text{s}$$

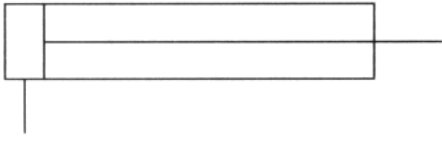
$$\text{Mechanical Efficiency} = P \times Q_{th} / hp =$$

$$= 5000 \times 0.0689 \times 10^5 \times 0.00327 / 156 \times 746$$

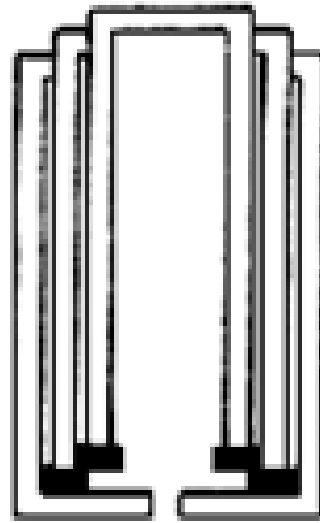
$$= 0.9679$$

Question three (5 marks)

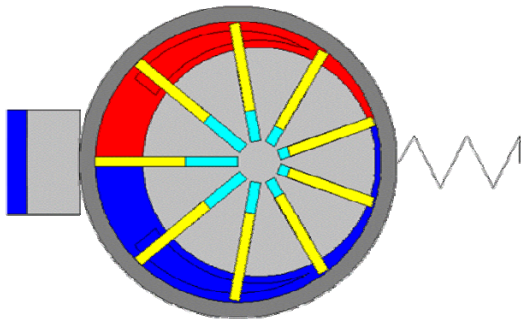
Write down the words that represent each of the following:



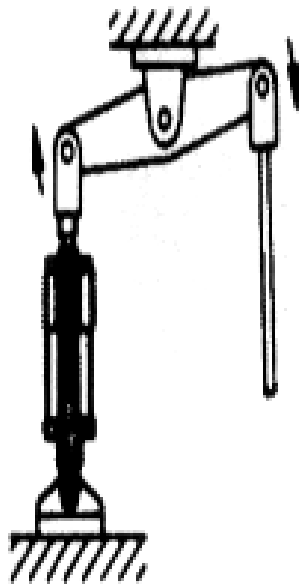
Single-Acting Hydraulic Cylinder



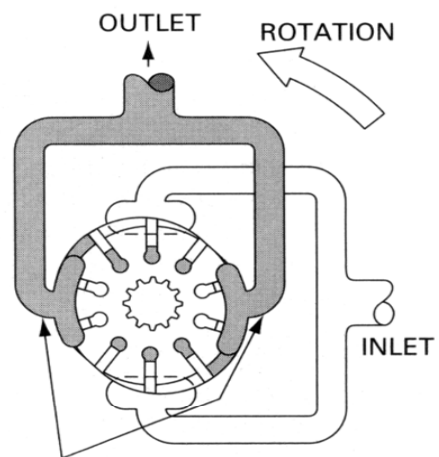
Telescopic cylinder



Variable Displacement Vane Pump



First-class lever



Balanced Vane Pump