



College of Engineering & Technology

Department: Mechanical Engineering

Lecturer: Dr. Rola Afify

Course Code: ME464

Marks: 10

Time: 3:00 - 4:00

Date: 29/4/2014

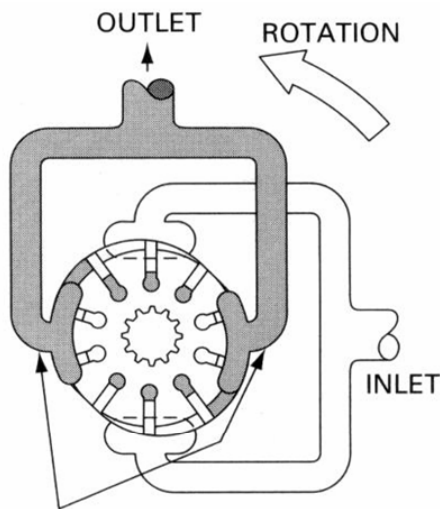
Name: Model Answer

R.N.:

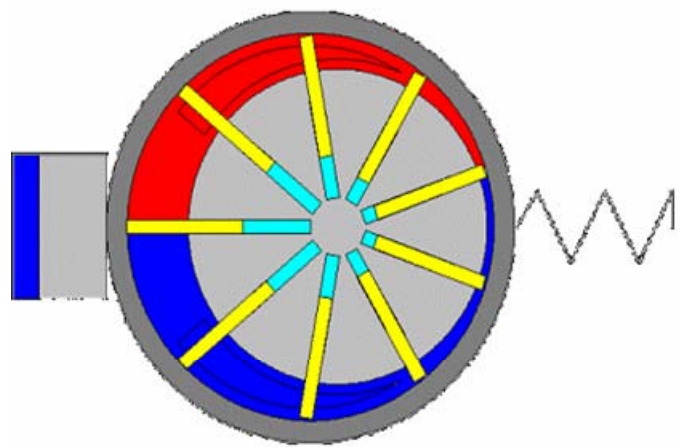
Answer the following questions:

Question one (4 marks)

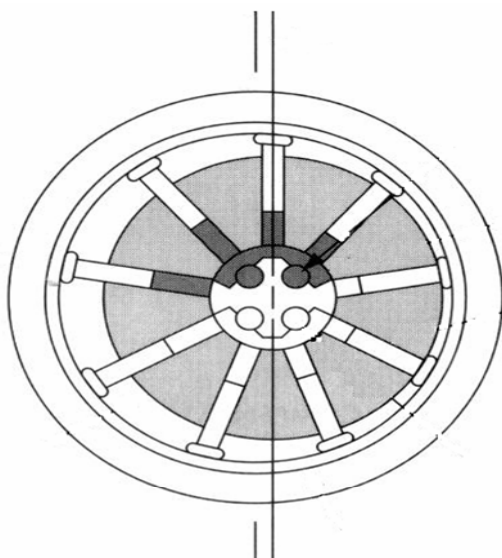
Write down the words that represent each of the following:



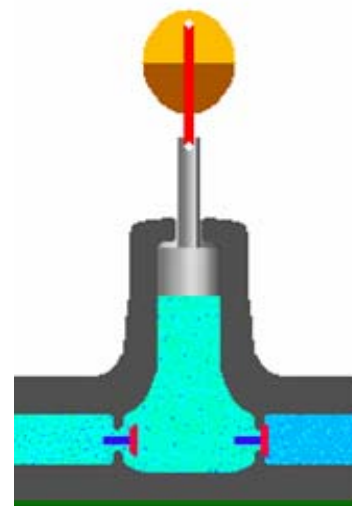
Balanced Vane Pump



Variable Displacement Vane Pump



Radial Piston Pump



Piston Pump

Question two (6 marks)

Compare between Vane Pump and Piston Pump using neat sketches.

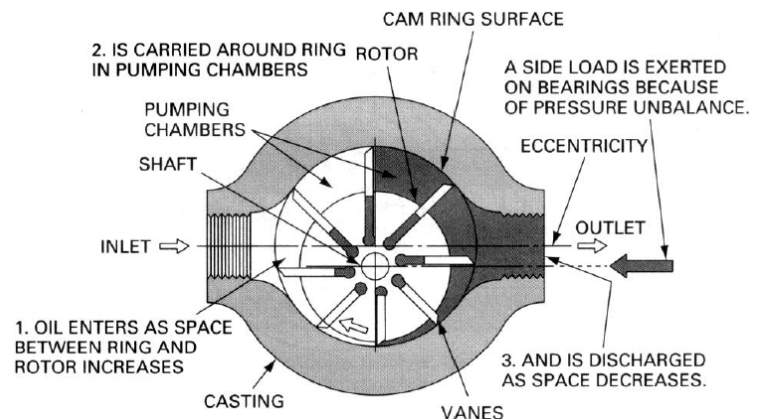
Vane Pumps

The Rotor, which contains Radial Slots, is splined to the Drive Shaft and Rotates inside a Cam Ring. Each Slot contains a Vane designed to mate with the surface of the Cam Ring as the Rotor Turns. Centrifugal Force keeps the Vanes Out against the Surface of the Cam Ring. During One-Half Revolution of Rotor Rotation, the Volume increases between the Rotor and Cam Ring. The resulting Volume Expansion causes a

Reduction of Pressure. This is the Suction Process, which causes Fluid to Flow through the Inlet Port and Fill the Void. As the Rotor Rotates through the Second Half Revolution, the Surface of the Cam Ring pushes the Vanes Back into their Slots, and the Trapped Volume is reduced. This Positively ejects the Trapped Fluid through the Discharge Port.

The Actual Volumetric Displacement occurs when $e_{\max} = e$:

$$V_D = \frac{\pi}{2} (D_C + D_R)eL$$



Piston Pumps

A Piston Pump works on the Principle that a Reciprocating Piston can draw in Fluid when it retracts in a Cylinder Bore and Discharge it when it extends. The basic question is How to Mechanize a Series of Reciprocating Pistons. There are Two Basic Types of Piston Pumps. One is the Axial Design, having Pistons that are parallel to the Axis of the Cylinder Block. Axial Piston Pumps can be either of the Bent Axis Configuration or of the Swash Plate Design. The Second Type of piston pump is the Radial Design, which has Pistons arranged Radially in a Cylinder Block.

