

Self-Study **Sheet-2 Part-2, on Chapter-2: Pumps**

1- Select True (✓) or False (x) for each statement:

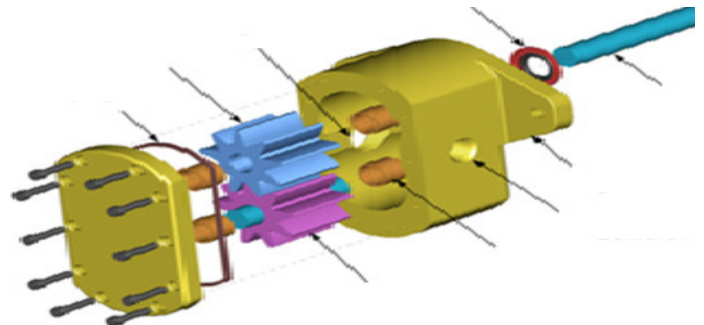
#	True	False	statement
1			Purpose of using any pump in hydraulic system is to have required flow rate in the system but not system pressure
2			Purpose of using any pump in hydraulic system is to have required system pressure but not flow rate in the system
3			All types of dynamic or positive displacement pumps may be used in a hydraulic system
4			The function of dynamic pumps is to create very high kinetic energy in the fluid and then transfer it into pressure
5			The types of positive displacement pumps include: gear pumps, vane pumps, piston pumps and centrifugal pumps
6			Centrifugal pumps are dynamic types pumps which may include rotary or reciprocating types
7			Gear pumps are dynamic types pumps which may include rotary or reciprocating types
8			Vane pumps are dynamic types pumps which may include rotary or reciprocating types
9			Positive displacement pumps are used in hydraulic systems due to the small flow rate needed in the system
10			Positive displacement pumps are used in hydraulic systems due to the high pressure values needed in the system
11			Rotary centrifugal pumps are used in hydraulic systems due to the high pressure values needed in the system
12			Rotary centrifugal pumps are used in hydraulic systems due to the small flow rate needed in the system
13			According to method of operation, all pumps are classified as: centrifugal, axial, rotary, reciprocating, gear, vane.
14			Gear pumps are positive displacement pump which may include rotary or reciprocating types
15			Vane pumps are positive displacement pump which may include rotary or reciprocating or mixed flow types
16			Piston pumps are positive displacement pump which may include rotary or reciprocating or mixed flow types
17			Positive displacement pumps include both reciprocating types and rotary types and mixed flow types
18			Reciprocating positive displacement pumps include both piston/plunger types and diaphragm types and gear types
19			Rotary positive displacement pumps include both single rotor types and multiple rotor type and centrifugal types
20			Single rotor positive displacement pumps include both vane, piston, flexible member, screw and peristaltic types.
21			Multiple rotor positive displacement pumps include both gear, lobe, circumferential and screw types
22			Reciprocating power positive displacement pumps include both single acting and double acting and gear types.
23			If the liquid can be handled by any type of pump, the most economical pump selection order is 1.centrifugal type, 2.rotary type, 3.reciprocating type
24			Hydraulic systems use positive displacement pumps because they are the most economic type of rotary pumps
25			Hydraulic systems use positive displacement pumps because they provide relatively small flow at high pressures.
26			Positive displacement pumps force the liquid into the system by the movement of a piston, vane, screw, or roller.
27			Positive displacement pumps force liquid into the system regardless resistance opposing the flow in the circuit.
28			Advantage of PDP is higher overall efficiency than centrifugal pumps because internal losses are minimized.
29			Pumps do not pump pressure, they create flow while pressure is a results of resistance to flow
30			Pump capacity is calculated as: $GPM = \text{speed(rpm)} \times \text{displacement (in}^3/\text{rev)} / 231$
31			Gear pumps are not compact, relatively expensive, and have many moving parts.

2. Compare between Dynamic (or kinetic) pumps and Positive Displacement Pumps with respect to method of energy conversion, range of output head, and range of output discharge. Give typical examples for Dynamic pumps and examples for Positive Displacement Pumps.

3. Discuss and Compare the main differences between Reciprocating PDP's and Rotary PDP's. Give typical examples for each type.

4. Select from list below & Write the name of each part of the **Gear pump** on the right place on the next figure:

Pressure port, drive gear, seal, case seal, drive shaft, Suction port, mounting flange, bushings, idler gear



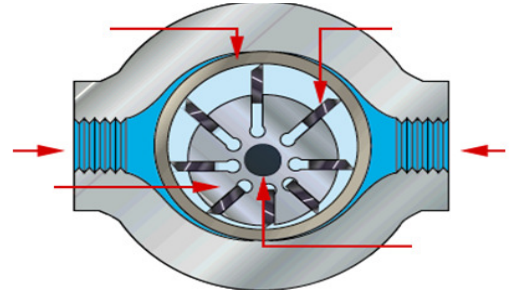
5. Discuss & Compare the main characteristics and differences between internal Gear pumps and external Gear pumps. Are Gear pumps of the fixed output type or variable output type? Discuss your answer.

6-**Gear pumps:** a)are variable volume. b)are centrifugal. c)have positive displacement. d)are pressure compensated

7-**Gear pump** displacement decreases as the input rpm is increased. a)True b) False



- 8-**Gear pumps** may be balanced or unbalanced. a)True b) False
- 9-**Gear pumps** may be de-stroked to zero outlet a)True b) False
- 10-**Gear pumps**: a)Trap fluid between teeth&housing. b)have many moving parts. c)control pressure control valves.
- 11- Select from the list below and Write the name of each part of the **Vane pump** on the right place on the next figure:
Rotor, inlet port, vane, shaft, cam ring, outlet port
- 12- The unbalanced **vane pump** uses an elliptical cam ring for opposing pressure quadrants. a)True b) False
- 13-**Vane pumps**: a) may be balanced or unbalanced. b) are not PDP.
c) use a rotor for pumping d) may be de-stroked to zero outlet
- 14-Which is not part of a **vane pump**? a) Vane b) Rotor c) Cam ring d) Barrel
- 15- In the unbalanced **vane pump** the pump shaft is not side loaded due to the use of an elliptical cam ring for opposing pressure quadrants. a)True b) False
- 16-Discuss & Compare the main characteristics & differences between unbalanced Vane Pumps & balanced Vane Pumps. Are Vane pumps of the fixed output or variable output flow type? Discuss your answer.
- 17-Increasing angle of the swash-plate in **piston pump**: a) decreases the pistons displacement and the flow rate
b) allows pump to rotate faster c)increases the pump's outlet pressure d)) increases the pistons displacement.
- 18-**Axial piston pumps** utilize a rotating swash-plate. a) True b) False
- 19- **Piston Pumps**: a)turn reciprocating motion into rotating motion b)utilize one piston only c)require a case drain
d)are fixed volume only.
- 20-when an **axial piston pump** is de-stroked or fully compensating: a)the swash-plate is at a 19° angle b) the swash-plate is at a 0° angle c)there is no pressure d) there is maximum flow
- 21-A pressure compensated pump will de-stroke when flow is not blocked. a) True b) False
- 22-when pressure compensated pump is on stroke, system is at rated flow and working pressure. a)True b)False
- 23-Discuss & Compare the main characteristics & differences between fixed output swash plate pump and variable output type. Show two different methods for changing the output displacement of swash plate pump types.
- 24-Using simple sketches, discuss & compare the main characteristics & differences between fixed output hydraulic circuit type versus variable output hydraulic circuit type.
- 25- Using some simple sketches, discuss the meaning of "pressure compensation" and show the methods for doing pressure compensation for variable flow PDP's.
- 26- Discuss five different troubleshooting problems that may be found with using the positive displacement rotary pumps in hydraulic circuits. Discuss how can these problems be overcome?
- 27-**Gear Pumps**: a)may be variable b)are usually not used in hydraulics c)change displacement with changes in rpm d)give constant output with constant rpm
- 28-**Variable displacement pumps** change the output flow by: a)changing either pump's rpm and/or swash-plate angle b)only changing the swash-plate angle c)only changing the pump's rpm
- 29-**variable volume pumps** may also be pressure compensated a) True b) False
- 30-Piston Pumps: a)increase flow by increasing the angle of the swash-plate b)decrease flow with increase in swash-plate angle c)are at full displacement when the rotating group is turning.



----- End of Pumps -----