

## UNITII – HYDRAULIC SYSTEM AND ITS COMPONENTS

### QUESTION BANK – I

#### PART-A

(10 x 2 = 20)

1. List out the different types of pumps used in hydraulics.

*Positive Displacement pumps* – Rotary type: gear pumps and vane pumps and  
Reciprocating pumps: piston pump and its types

*Non-Positive Displacement pumps* – Centrifugal pumps, axial and radial flow pumps.

2. What are the important components of a hydraulic power pack?

*Tank, pump, valves, actuators* etc.

3. What is meant by variable displacement pump?

Displacement can be varied by changing the physical relationships of various pump elements and this change in pump displacement produces a change in output of fluid flow even the *pump speed remains constant*.

4. Where are rod less cylinders used?

When the load needs to be *moved some distance from the cylinder* itself, material handling, loading, feeding, lifting and web cutting applications.

5. Distinguish between positive displacement and variable displacement pumps.

Sl.No	Positive Displacement Pumps	Variable Displacement Pumps
(i)	Pressure development is main requirement	Pressure development is main requirement but not with same mechanical structure
(ii)	Changes doesn't need to be made	Mechanical changes has to be made

6. What is a telescoping rod cylinder? When it would be normally used?

Telescopic cylinders are a special design of a hydraulic cylinder or pneumatic cylinder which provide an exceptionally *long output travel from a very compact retracted length*. Typically the collapsed length of a telescopic cylinder is 20 to 40% of the fully extended length depending on the number of stages.

7. How is pumping action in the positive displacement pumps accomplished?

*A partial vacuum is generated in the pump cavity*. The vacuum created in the cavity makes the outlet check valve to close the outlet line and also the atmospheric pressure to push the fluid from the reservoir via the inlet and the piston pushing back makes the oil to go to the outlet.

8. What is a hydraulic actuator?

A linear actuator or a hydraulic cylinder is a device that converts fluid power into *linear mechanical force and motion*.

9. How are single acting cylinders retracted?

The piston is retracted by *gravity or by a compression spring*

10. What is meant by synchronization of hydraulic actuators?

The *movement of two or more cylinders* to complete some phase of operation to accomplish the identical task from the cylinders at the same rate is called synchronization.

**PART-B**

**(4 x 16 = 64)**

11. a) (i) Explain the working of a simple vane pump with a neat sketch  
(*Keywords: Unbalanced vane pump diagram, pump explanation and working principle*)
- (ii) Explain the factors considered in the selection of pumps.  
(*Keywords: Safety and maximum system working pressure, allowable pump speeds, rated pump performance, system flow rate requirements, variable displacement control etc.*)
- b) How is pumping action accomplished in a positive displacement pump? Classify any one of it further and explain the working principle of those pumps.  
(*Keywords: Pumping theory diagram and working principle, Pump classification as positive, non-positive displacement pumps, Explanation of either various rotary types pumps or reciprocating pumps.*)
12. a) (i) With a neat sketch explain the end cushion provided in hydraulic cylinders  
(*Keywords: Cushioning mechanism diagram and its working principle explanation*)
- (ii) Explain the factors which affect the selection of pumps and discuss in detail the classification and performance features of different types of hydraulic pumps  
(*Keywords: Pump problems like pump noise, slip, cavitations' and pump ripple Classification as positive and non-positive displacement and performance curves*)
- b) List out the various types of hydraulic cylinders and explain the construction, parts and working of a double acting cylinder with neat sketches  
(*Keywords: Types of hydraulic cylinders like single, double acting: special types: based on cushioning features, plunger movements etc and double acting cylinder diagram and its working.*)
13. a) (i) Explain the working of a radial piston pump with a neat sketch. Also write an expression for the theoretical displacement per revolution of the shaft.  
(*Keywords: Radial piston pump diagram, construction, working principle and theoretical discharge calculations.*)
- (ii) Describe the constructional details of a double acting cylinder with cushioning mechanism and give names for the parts.  
(*Keywords: Double acting cylinder diagram and cushioning mechanism diagram*)
- (iii) What are fluid motors?  
(*Keywords: To convert hydraulic energy into rotary energy. Gear pump, vane pump etc.*)
- b) Explain with a neat sketch the working principle of a variable displacement vane pump.  
(*Keywords: Variable displacement vane pump diagram, pump explanation and working principle variable and analysis of volumetric displacement*)

14. a) Explain with a neat sketch the construction and working of various types of gear pumps  
(*Keywords: Diagrams of external, internal, lobe, screw and gerotor pumps. Construction and working principle*)
- b) (i) Explain a hydraulic press circuit which employs double pump unloading principle  
(*Keywords: Bramah's hydraulic press and its working principle with diagram*)
- (ii) Explain any two types of cylinders used in fluid power system  
(*Keywords: Explanation of single acting and double acting cylinders with diagrams.*)

## UNIT II – HYDRAULIC SYSTEM AND ITS COMPONENTS

### QUESTION BANK – II

#### PART-A

1. Describe the working principle of screw pumps.
2. How do you specify a pump?
3. What is pump Cavitations? How can you avoid it?
4. What is pressure compensated flow control?
5. What are safety circuits?
6. Why gear pump cannot be used as a variable displacement pump?
7. Define volumetric efficiency of the pump.
8. What is a positive displacement pump and how does it differ from a centrifugal pump?
9. Name the different designs of vane pump.
10. What is cylinder cushioning?

#### PART-B

11. a)(i) Explain the construction and working of an swash plate type piston pump with neat sketch.
- (ii) Write a short note on Telescopic cylinder.
- b) Explain the construction and working of gear rotor and screw pump.