

Self-Study **Sheet-3** Part-2, **on Chapter-3: Actuators**

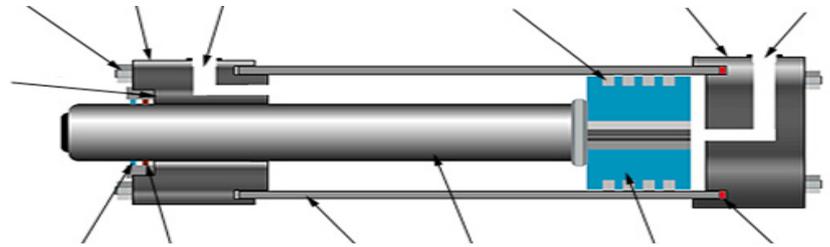
1- Select True (√) or False (x) for each statement:

| # | True | False | statement  |
|---|------|-------|--|
| 1 |      |       | The actuator is the end point of hydraulic circuit that converts mechanical horsepower into hydraulic horsepower |
| 2 |      |       | Actuators may do linear motion such as hydraulic motors or do rotating motion such as hydraulic cylinders        |
| 3 |      |       | Hydraulic cylinders are linear type actuators and their output force, or motion, is along a circular line.       |
| 4 |      |       | The function of hydraulic cylinders are to convert hydraulic horsepower into mechanical torque                   |
| 5 |      |       | Work applications may include pushing, pulling, tilting, and pressing.   |
| 6 |      |       | A ram cylinder is the most simple actuator. It has two fluid chambers and exerts force in only one direction     |
| 7 |      |       | A ram cylinder may not be used in applications where stability is needed on non-heavy loads.                     |
| 8 |      |       | A double rod ram cylinder is single acting type which is pressurized on one end only                             |
| 9 |      |       | A ram cylinder is designed so that the load or an internal spring, retracts the cylinder.                        |

2- What is the purpose of an actuator. Give some examples for the most commonly used actuators.

3-Compare the main parts, characteristics & differences between the Ram Cylinder, single acting, and double acting or differential cylinder. Compare between spring-loaded and unloaded cylinders.

4-Select from the list below and Write name of each part of the **Double acting cylinder** on the right place on the next figure:



*Rod end head, piston seals, rod wiper, cap end port, the rod, barrel, static seals, Rod end port, cap end head, rod bearing, rod seal, piston, piston rod*

5-At same pressure, cylinder will produce more force on extend stroke than on retract stroke. a)True b)False

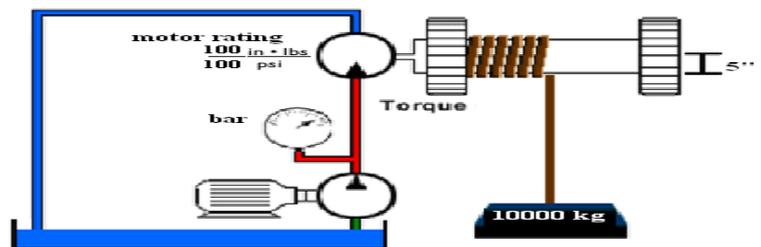
6- Select True (√) or False (x) for each statement:

| #  | True | False | statement  |
|----|------|-------|--|
| 1  |      |       | Double acting cylinders apply pressure to either side or either port, giving torque power in both directions           |
| 2  |      |       | Double acting cylinders are classified as differential cylinders due to unequal exposed areas during extend&retract    |
| 3  |      |       | In double acting cylinders, extension is faster than retraction due to difference in effective area caused by the rod. |
| 4  |      |       | In double acting cylinders, more force is generated on extension stroke because of the greater effective area          |
| 5  |      |       | In double acting cylinders, more force is generated on retraction stroke because of the greater effective area         |
| 6  |      |       | The double-rod cylinder is a single acting, non-differential type cylinder as both sides of the piston are equal       |
| 7  |      |       | In double-rod cylinder both expansion and retraction strokes move with the same speed in both directions               |
| 8  |      |       | Tie rod hydraulic cylinders are more robust than the Mill type hydraulic cylinders.                                    |
| 9  |      |       | Hydraulic motors are classified as linear and non-rotary type actuators that resemble pumps in construction.           |
| 10 |      |       | Hydraulic motors are rotary type actuators that converts hydraulic energy into axial linear force.                     |
| 11 |      |       | In hydraulic motors, both inlet and outlet ports may be pressurized and thus most motors are externally drained.       |
| 12 |      |       | Most common types of hydraulic motors are gear, vane, piston, and swash-plate type motors.                             |
| 13 |      |       | Hydraulic motors are rated according to displacement, torque, and the stroke   |

7- How can hydraulic motors be rated. Give some examples based on the rpm or on the torque.

8-Compare the main parts, characteristics & differences between the hydraulic-Gear motor, the hydraulic-Vane motor, and the hydraulic-Piston motor. Give typical examples with sketches.

9-In the figure below, find the required pressure output of the pump to run the specified hydraulic motor.



----- End of Actuators -----