

Self-Study **Sheet-11** Part-2, **on Chapter-12: Understanding Schematics**

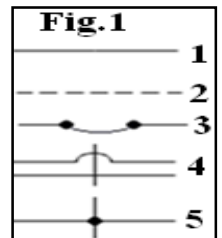
1- Discuss the usage, types, main advantages of hydraulic graphic symbols used in hydraulic schematic drawings.

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

#	True	False	statement
1			Hydraulics schematic is line drawing of series of symbols & connections represent actual components in hydraulic system
2			Hydraulic graphic symbols are: considered as international language, used for technical communication, show function and method of operation of all the system components.
3			Symbol for directional control valve has multiple envelopes showing number of positions & ports the valve may have.
4			The symbol for a flexible hose is not a dashed line but a solid continuous line
5			Arrows drawn in each envelop of directional control valve indicate possible direction & flow if valve is in that position
6			Ports on pressure valve symbol are indicated as 1 & 2, or primary & secondary. Flow is from secondary to primary ports
7			All pressure control valves are normally closed with the exception of a pressure relief control valve
8			Spring located perpendicular to the arrow indicated that spring force does not hold the valve closed.
9			All pressure control valves are normally closed with the exception of a sequence control valve
10			Symbol for any directional control valves has 3 squares showing number of positions & 3 of ports the valve may have.

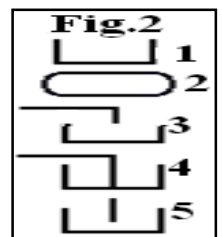
3- From the next fig.1, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates a hose usually connected to a moving part.
	Indicates lines that may use loops at crossovers or be straight across.
	Indicates a working pressure line, pilot supply, return, or electrical line
	Indicates lines that may use a dot at the junction or can be at right angles.
	Indicates a pilot line, drain, purge, or bleed line



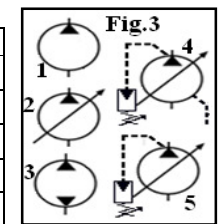
4- From the next fig.2, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates reservoirs that may have fluid oil lines terminating above the fluid level
	Indicates reservoirs that may have fluid oil lines terminating below the fluid level
	Indicates Pressurized reservoirs
	Indicates common reservoir, it minimizes need to draw number of lines returning to reservoir
	Indicates Reservoirs that are open or vented to the atmosphere



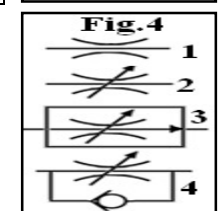
5- From the next fig.3, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates bi-directional fixed output flow pump
	Indicates pressure compensated, variable output flow pump
	Indicates variable output flow pump or can be regulated without changing shaft speed
	Indicates uni-directional fixed output flow pump
	Indicates pressure compensated, variable output flow pump with internal leakage returned to tank



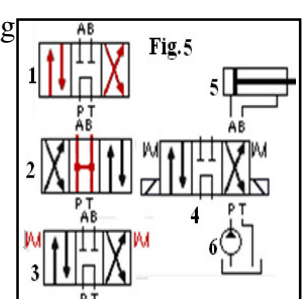
6- From the next fig.4, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates an adjustable orifice flow control valve
	Indicates an adjustable orifice flow control valve with reverse flow around the valve
	Indicates a fixed orifice or a needle flow control valve
	Indicates pressure compensated orifice or true flow control valve



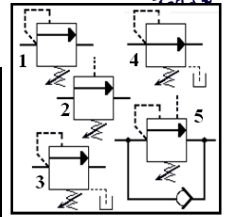
7- From the next fig.5, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates 3 positions 4 ports, Tandem type, spring centered, directional control valve
	Indicates 3 positions 4 ports, Tandem type, directional control valve
	Indicates uni-directional fixed output flow pump
	Indicates 3 positions 4 ports, open centered type, directional control valve
	Indicates 3 positions 4 ports, Tandem type, solenoid actuated directional control valve
	Indicates a double acting cylinder with two load ports A & B



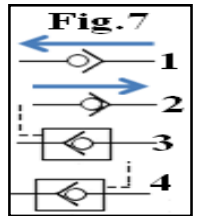
8- From the next fig., select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates unloading pressure control valve, normally closed, external piloted, with adjustable spring
	Indicates reducing pressure control valve, normally open, with external drain and adjustable spring
	Indicates counterbalance or brake valve, normally closed, external piloted, with bypass check valve
	Indicates sequence pressure control valve, normally closed, with external drain and adjustable spring
	Indicates pressure relief valve, direct acting, normally closed with adjustable spring



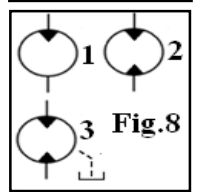
9- From the next fig.7, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates pilot operated to close the check valve
	Indicates pilot operated to open the check valve
	Indicates returned flow is blocked and check valve is closed
	Indicates free flow through a check valve and check valve is open



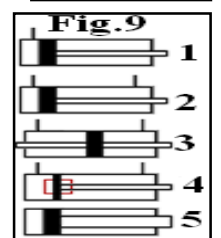
10- From the next fig.8, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates bi-directional or reversible hydraulic motor with external drain line
	Indicates uni-directional or non-reversible hydraulic motor with no drain line
	Indicates bi-directional or reversible hydraulic motor with no drain line



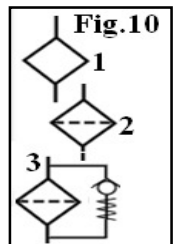
11- From the next fig.9, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates double-acting cylinder, line pressure for both extending and retracting
	Indicates hydraulic cylinder with extra-large rod
	Indicates double-acting cylinder, piston with cushion device at the end of the stroke
	Indicates single-acting cylinder, line pressure for extending only
	Indicates double-acting cylinder, double-rod piston, line pressure for extending & retracting



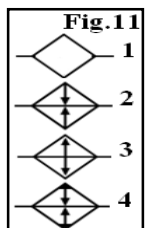
12- From the next fig.10, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates filter or strainer fluid conditioning device
	Indicates primary symbol for a fluid conditioning device
	Indicates filter or strainer fluid conditioning device with bypass check valve if filter is clogged



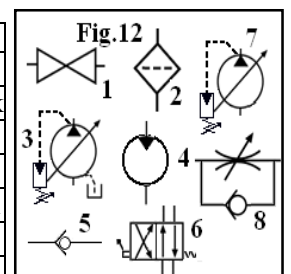
13- From the next fig.11, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates temperature control device for fluid conditioning
	Indicates cooler heat-exchanger for fluid conditioning
	Indicates primary symbol for a fluid conditioning device
	Indicates heater heat-exchanger for fluid conditioning



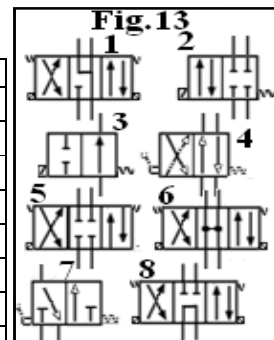
14- From the next fig.12, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates filter or strainer fluid conditioning device
	Indicates pressure compensated, variable output flow pump with internal leakage returned to tank
	Indicates uni-directional or non-reversible hydraulic motor with no drain line
	Indicates a gate valve, non-automatic on/off valve, used for line isolation
	Indicates 2 positions 4ports directional control valve, paddle actuated with spring force to return
	Indicates pressure compensated, variable output flow pump without internal leakage line
	Indicates an adjustable orifice flow control valve with reverse flow around the check valve
	Indicates check or non-return valve



15- From the next fig.13, select the correct number of the symbol that matches the given meaning:

# of symbol	Meaning of the symbol
	Indicates 2positions-2ports directional control valve,solenoid activated to close, normally open
	Indicates 2positions-3ports directional control valve,paddle activated to shift the valve
	Indicates 2positions-4ports directional control valve,solenoid activated to open, normally closed
	Indicates 3positions-4ports directional control valve,solenoid activated, Tandem center type
	Indicates 3positions-4ports directional control valve,solenoid activated, open center type
	Indicates 3positions-4ports directional control valve,solenoid activated, closed center type
	Indicates 3positions-4ports directional control valve,solenoid activated, floating center type
	Indicates 2positions-4ports directional control valve,paddle activated to shift against spring force

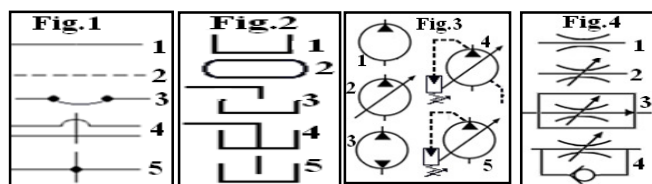


16- Discuss the meaning & usage of each **line** symbol on fig.1.

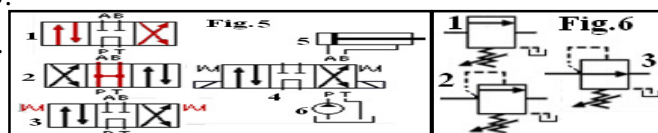
17- Discuss the meaning & usage of **reservoir** symbols on fig.2.

18- Discuss the meaning and the usage of **pump** symbols on fig.3.

19- Discuss meaning and usage of **Flow Control Valves** on fig.4.

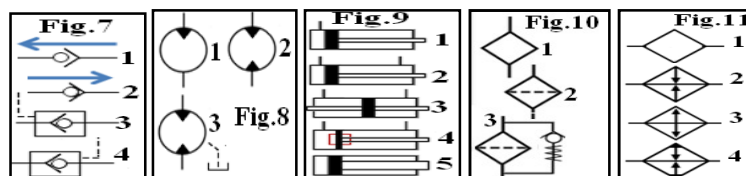


20- Discuss the meaning, type and the usage of each of the **directional Control Valves** on fig.5.



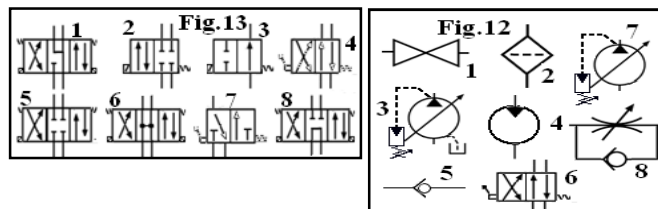
21-Discuss the meaning, type and the usage of each of the **Pressure Control Valves** on fig.6.

22-Discuss the meaning, type and the usage of each of the **Pressure Control Valves** on fig.7.



23-Discuss the meaning and the usage of the **hydraulic motors** on fig.8.

24-Discuss meaning and usage of **hydraulic cylinders** on fig.9



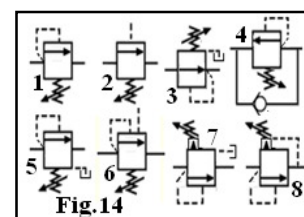
25- Discuss meaning and usage of the **Filters** on fig.10.

26- Discuss the meaning and the usage of each of the **Heat Exchangers** on fig.11.

27- Discuss meaning & usage of each component on fig.12.

28- Discuss the meaning and the usage of each component shown on fig.13.

29- Discuss the meaning and the usage of each component on fig.14.



***** End of Understanding Schematics *****