Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

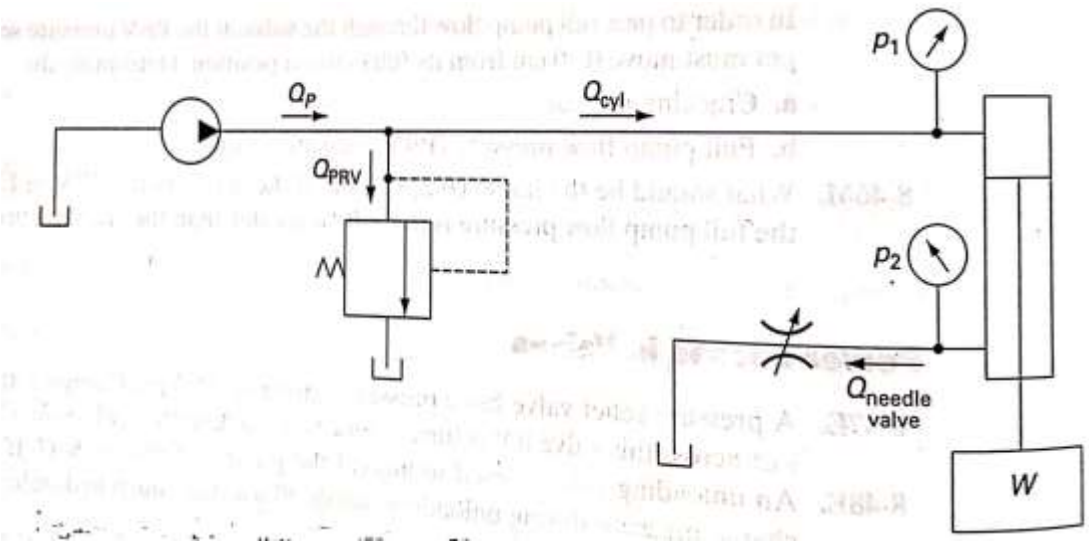
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Hydraulics & Pneumatics **Semester: VI**
Program: B.Tech- Mechatronics **Time : 03 hrs.**
Course Code: MEEL313 **Max. Marks: 100**

Instructions:

SECTION A

S. No.		Marks	CO
Q 1	Sketch the graphical symbol of the following hydraulics component as given below (a) solenoid-actuated, three position, spring-centered, four-way direction control valve (b) shuttle valve (c) compound pressure relief valve (d) unloading valve (e) pressure compensated flow control valve	**5**	**CO1**
Q 2	Sketch the graphical symbol of the following pneumatics component as given below (a) pressure regulator (b) 4-way push button direction control valve (c) filter-regulator-lubricator (d) pneumatic silencers (e) shuttle valve	**5**	**CO2**
Q 3	Classify different types of control valve.	**5**	**CO2**
Q 4	Discuss the primary function of hydraulics & pneumatics circuit.	**5**	**CO3**
	SECTION B		
Q 5	A pressure relief valve contains a poppet with a 4.20cm^2 area on which system pressure acts. During assembly a spring with a spring constant of 3200 N/cm is installed in the valve to hold the poppet against its seat. The adjustment mechanism is then set so that the spring is initially compressed 0.50 cm from its free length condition. In order to pass full pump flow through the valve at the PRV pressure setting, the poppet must move 0.30 cm from its fully closed position. Determine (a)cracking pressure (b)full pump flow pressure (PRV pressure setting)	**10**	**CO4**

Q 6	The system of figure 1 has a hydraulic cylinder with a suspended load W. The cylinder piston and rod diameters are 50mm and 25 mm respectively. The pressure relief valve setting is 50 bar. Determine the pressure p_2 for a constant cylinder speed if (a) W= 1000N (b) W=0  Figure1	**10**	**CO3**
Q 7	Design the hydraulic circuit for the drilling machine application and sequential control double acting hydraulic cylinders.	**10**	**CO4**
Q 8	Sketch the constructional and operational features of hydraulic counterbalance valve. OR Sketch the constructional and operational features of pneumatic filter-regulator-lubricator.	**10**	**CO2**
	SECTION-C		
Q 9	For the fluid power system shown in figure2, determine the external load(F_1 and F_2) that each hydraulic cylinder can sustain while moving in the extending direction. take frictional pressure losses into account. the pump produces a pressure increase of 50 bar from the inlet port to the discharge port and a flow rate of 5cm^3/sec. The following data are applicable. Kinematic viscosity of oil =0.001m^2/sec Specific weight of oil =50 N/m^3 Cylinder piston diameter =10mm Cylinder rod diameter=5mm All elbows are 90° with K factor=0.75	**20**	**CO3**

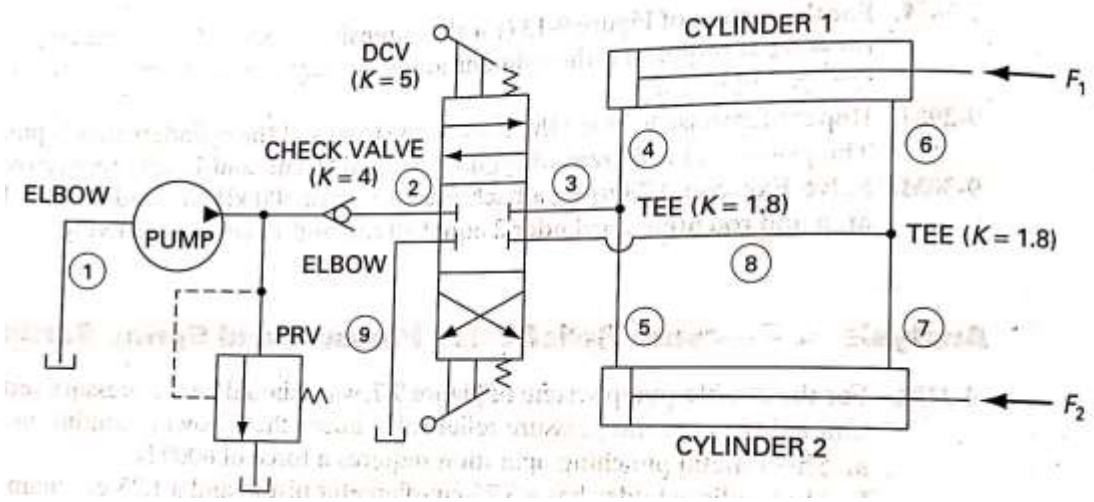


Figure 2

Pipe lengths and inside diameters are given as follows;

Pipe No.	Length(mm)	Dia(mm)	Pipe No.	Length(mm)	Dia(mm)
1	6	2	6	10	1
2	30	1.25	7	10	1
3	20	1.25	8	40	1.25
4	10	1.0	9	40	1.25
5	10	1.0			

Q 10

For the circuit as shown in figure3, cylinder 1 will not hold against a load while cylinder 2 is retracting. Modify this circuit by adding a pilot check valve and appropriate piping so that cylinder 1 will hold while cylinder 2 is retracting.

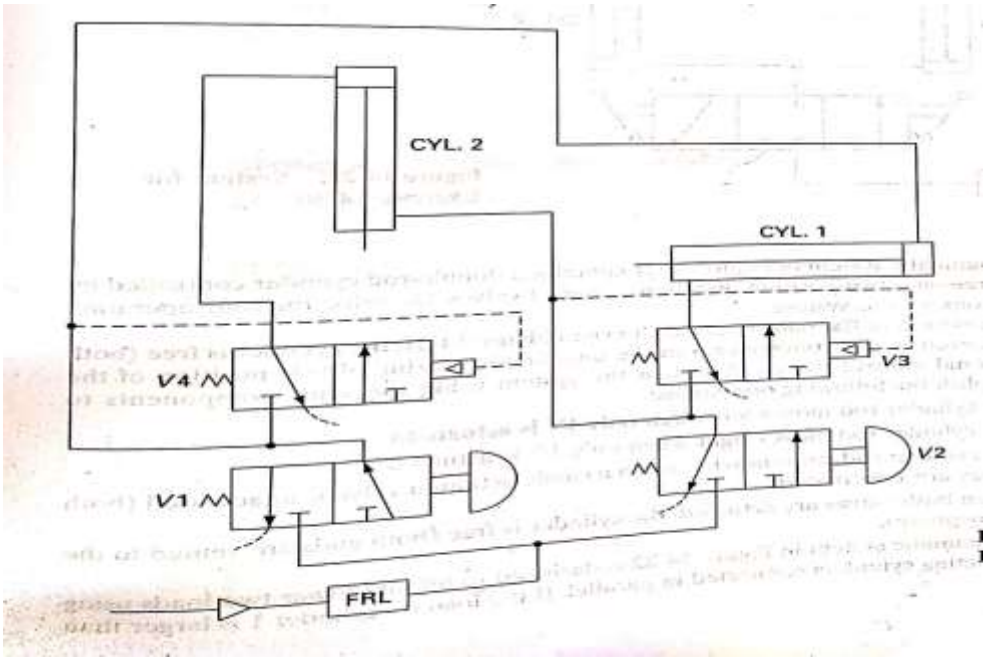


Figure 3

20 **CO4**

OR

The pneumatic system in figure 4 is designed to lift and lower two loads using single -acting cylinders connected in parallel. If the load on cylinder 1 is larger than the load on cylinder 2, what will happen when the directional control valve is shifted into the lift mode. Redesign this system so that the cylinders will extend and retract together.

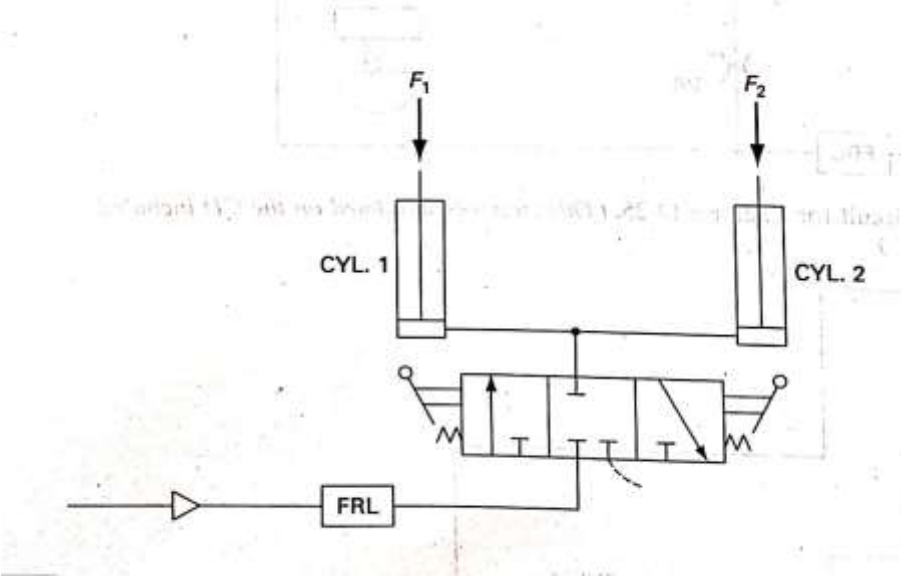


Figure 4