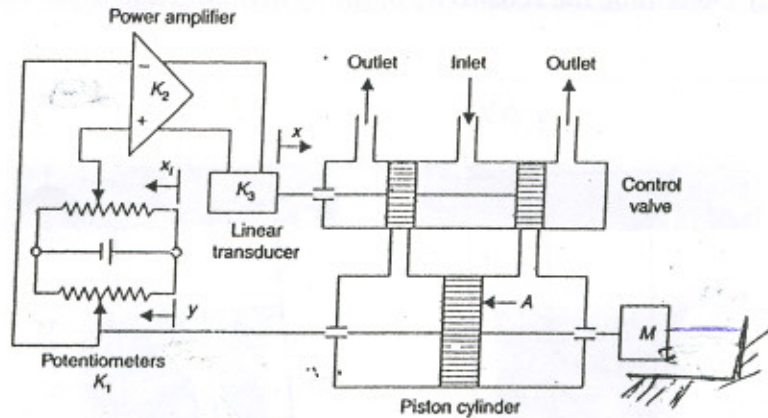
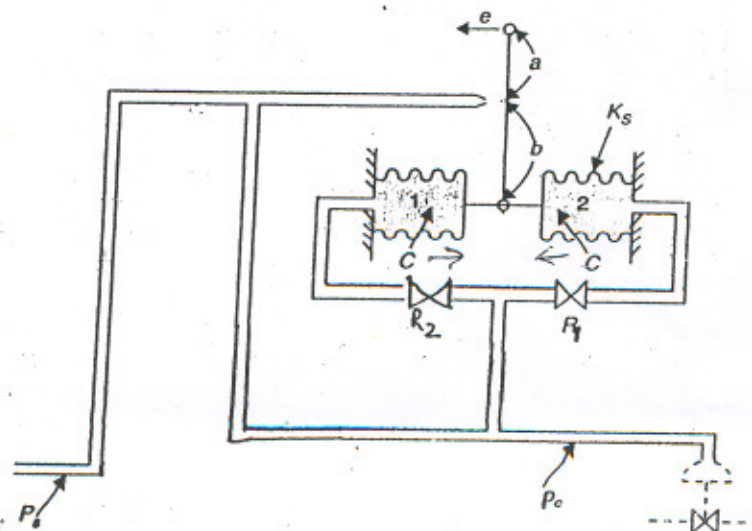


- Q1. The electro hydraulic position control system, shown in figure below positions a mass mass  $M$ . Assume that rate of oil flow to the piston is  $q = K_v x - K_r p$ . where Valve coefficient is  $k_v$ , area of piston is  $A$ , supply pressure is  $p$ ,  $K_r$  is a constant and  $x$  is the valve opening. Draw the block diagram of the system and determine the transfer function  $Y(s)/X_i(s)$ .



- Q2. A 4-stack stepper motor has 30 numbers of teeth; assuming that stack rotor teeth align with its stator, calculate the angular displacement between stacks of stator teeth.
- Q3. The schematic diagram of a pneumatic controller is given below. Draw the block diagram of the system and determine the transfer function  $P_c(s)/E(s)$ . Flapper nozzle valve coefficient is  $K_f$ .



1 (-ve)  
2 (+ve)

(c) Determine the sensitivity of the system for changes in the  $K$  for  $\omega = 0$  rad/sec

