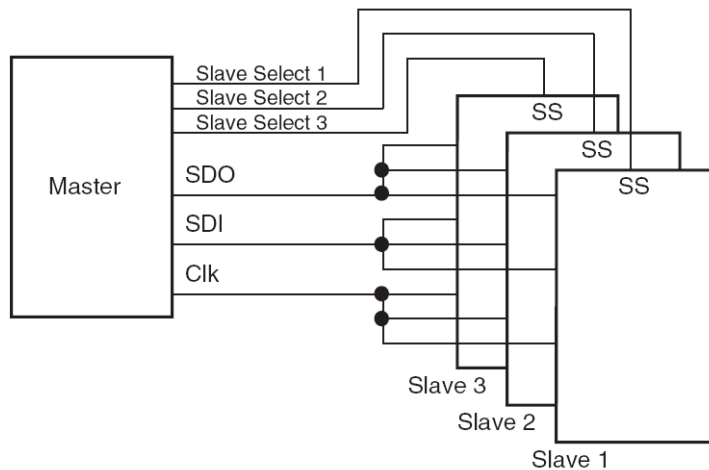


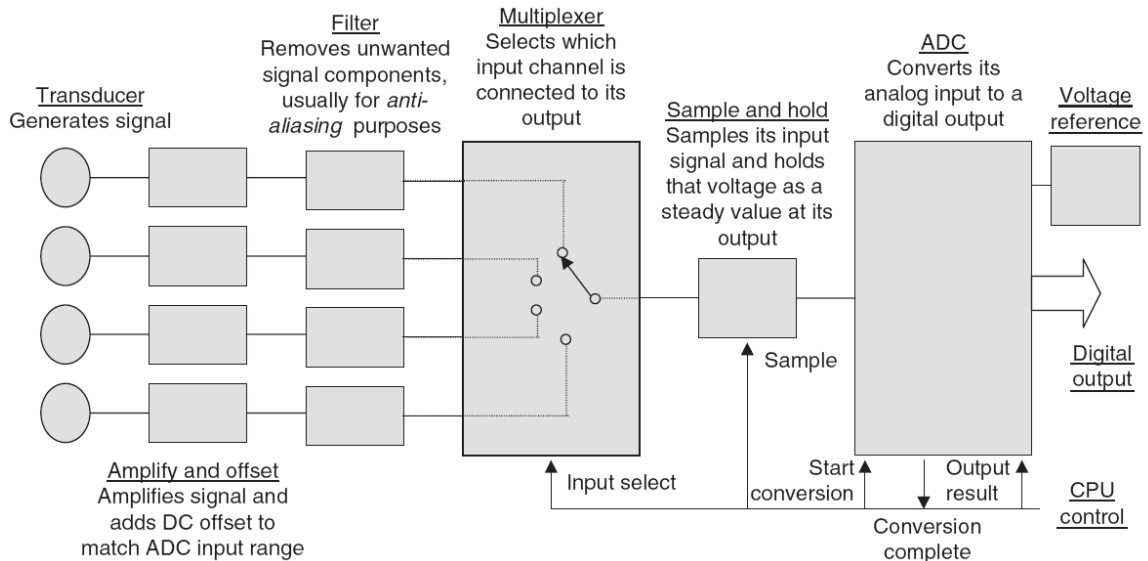
Instructions: Time 15 minutes. Closed books and notes. No calculators. Please answer all problems in the space provided. **No questions are allowed.**

Each problem 4 marks

Q. Draw a diagram that shows the connections of a synchronous master with three slaves.



Q. Draw a block diagram that shows the elements of a typical data acquisition system.



Q. For the input protection circuit shown below, assume that $R_{prot}=2\text{ k}\Omega$ and the diode's forward voltage is 0.3 V. What is the maximum and minimum input voltage spikes that this circuit can protect against?

The maximum and minimum input voltages depend on the current rating of the two diodes. For example, if $I_D = 20\text{ mA}$, then

$$V_{max} = R_{prot} * I_D + 0.3 + 5 = 45.3\text{ V}$$

$$V_{min} = - R_{prot} * I_D - 0.3 = -40.3\text{ V}$$

