Sheet 6

1. Gas at 70 bars gauge pressure and 38°C is contained a 12900 cm^3 cylinder. A piston compresses the volume to 9680 cm^3 while the gas is heated to 93°C
   What is the final pressure in the cylinder?

2. Air is used at a rate of 0.014 m^3/s from a receiver at 32°C and 8.6 bar. If the atmospheric pressure and temperature are 1.01 bar and 21°C. What is the free air that the compressor must provide?

3. Calculate the required size of a receiver that must supply air to a pneumatic system consuming standard 0.56 m^3/min for 6 minutes between 687 kPa and 552 kPa while the compressor is running and delivering air at 0.14 m^3/min.

4. Determine the actual power required to drive a compressor that delivers standard 2.8 m^3/min of air at 6 bar gauge. The overall efficiency of the compressor is 75%.

5. Air at 2.7°C passes through a 13 mm diameter orifice having a flow capacity constant of 7.4, If the upstream pressure is 5.5 bar, what is the maximum flow rate of air? (NOTE: for maximum flow rate to occur in standard m^3/min, pressure downstream is 53% of pressure upstream)

6. A pneumatically powered impact tool requires standard 1.4 m^3/min at 689.5 kPa gauge. What size valve (C_v) should be selected for this application if the valve pressure drop should not exceed 80 kPa, and the upstream air temperature is 27°C?

7. A single acting pneumatic cylinder with a piston diameter of 44.5 mm and 152 mm piston stroke, drives a power tool using 687 kPa gauge at 27°C. If the cylinder reciprocates at 30 cycles/min, determine the air consumption rate in m^3/min at standard atmospheric conditions (101 kPa and 20°C)