HW Ch # 6: Multiple evaporator and compressor systems

1- A single compressor, using R-134a refrigerant, has three evaporators of capacities 10 TR, 30 TR and 20 TR. The temperatures in all the three evaporators is to be maintained at − 5°C. The vapours leaving the evaporators are dry and saturated. The condenser temperature is 40°C. The liquid refrigerant leaving the condenser is sub-cooled to 30°C. Assuming isentropic compression, find the power required to drive the compressor and C.O.P. of the system.

2- A single compressor using R-134a refrigerant has three evaporators of capacities 10 TR, 20 TR, and 10 TR as shown in Figure .
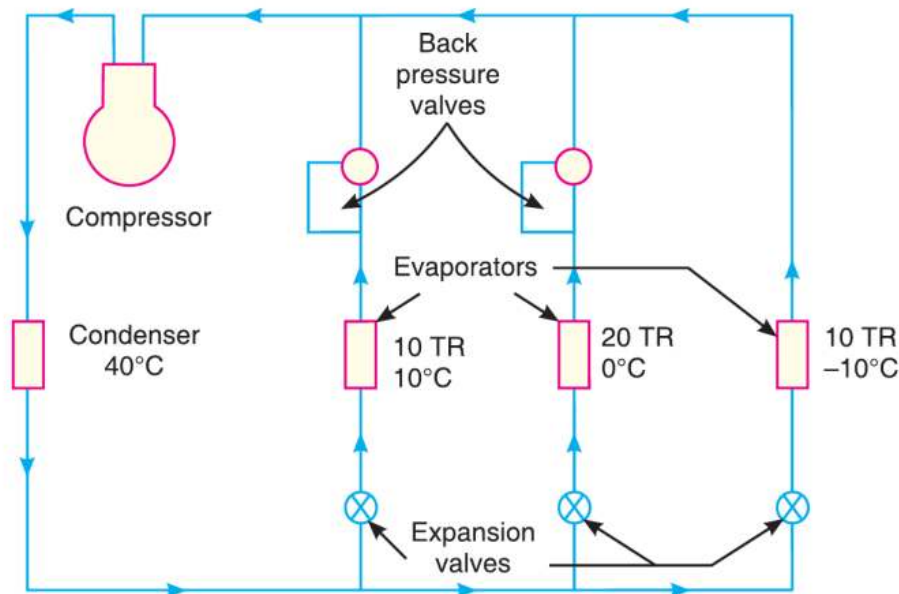
The temperature in the three evaporators is to be maintained at 10°C, 0°C and − 10°C respectively. The condenser temperature is 40°C. The vapours leaving the evaporators are dry and saturated.

Assuming isentropic compression, find the power required to drive the compressor and the C.O.P. of the system.

3- Derive the expression for C.O.P. of a refrigerating system consisting of two evaporators at different temperatures with individual compressors and individual expansion valves.