**Cleanroom Design 1st HW (Ver. A)**

**2016/10/24**

**1. A cleanroom with dimension (L\*W\*H) 60m\*40m\*4m need to retain 22°C DB, 47% RH, 25Pa static pressure and ISO class 3 @0.1μm cleanliness. (assume the air density=1.2kg/m3**



Graph 1: A cleanroom system

, **Aleakage=0.2 m2, α=0.3**

**The exhaust airflow rate for**

**general exhaust (Tex=35°C ) is 20,000CMH,**

**acid exhaust (Tex=22°C ) is 10,000CMH,**

**base exhaust (Tex=22°C ) is 10,000CMH and**

**VOC exhaust (Tex=22°C ) is 10,000 CMH.**

**Filter efficiency for**

**pre-filter is 30%**

**mid-filter is 80% and**

**final filter is 99.95%.**

**Cleanroom particle generation rate is 2.5x105 #/s, and outdoor air particle concentration is 1x108 #/m3**

**A. The summer outdoor air condition is 35°C and 80% RH, find**

**a. MAU cooling and heating loads (kW) with 16°C supply air temperature. (assume air reach 95% RH when leaving the cooling coil)** *(5 points each)*

**b. The condensed water flow rate (kg/s).** *(5 points)*

**B. The winter outdoor air condition is 5°C and 36% RH, find**

**a. MAU pre-heating load (kW) with 100****°C steam humidification and 16°C supply air temperature.** *(5 points)*

**b. The steam flow rate (kg/s).** *(5 points)*

**c. If the temperature for boiler water source is 5°C, find the boiler capacity (kW).**

**(assume the CP for water is 4.18 kJ/kg．k, and density is 1,000 kg/m3)** *(5 points)*

