

This is an open book exam. The exam period is 1300-1500. The use of sketches is encouraged where it is not required.

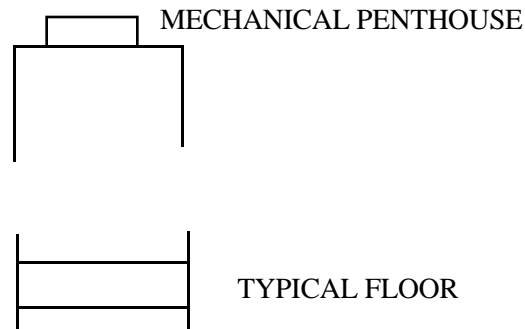


Figure 1.

1. Figure 1 shows the mechanical penthouse and a typical floor of a 40 storey office tower with a compartmentalized variable air volume air handling system.
 - 25% (a) Explain, using sketches the piping and ducting connections that would be required between the penthouse and the typical office floor for a variable air volume system with perimeter hot water radiation.
 - 15% (b) Describe the air handling system that would be required on a typical office floor.
- 15% 2. An eight storey office building has a plan area of 30 m x 40 m. The floor-to-ceiling height is 3 m. What would the cross-sectional area of the main supply duct at its largest point? Show your method of determining this.
- 25% 3. A very small office building has walls 4 m high floor to roof. It is 10 m wide and 20 m deep. The ceiling has a U-coefficient of 0.5, while the walls are made of two layered materials with thermal resistances (RSI) of 0.9 and 1.2. For this calculation, window areas are negligible. The uncontrolled air change rate per hour is 0.2 when the HVAC system is shut down and the building is unpressurized. What will be the heat loss for a design temperature of -20 °C?
4. Explain any four of the following:
 - 5% (a) equivalency
 - 5% (b) enthalpy
 - 5% (c) performance standard
 - 5% (d) heat recovery ventilator