



الاسم: بهلول وليد الرقم الجامعي: 0118159 الرقم التسلسلي: 21

**Question 1. [6 points]**

Fifty employees at a telecommunications center are working in an open space, The space is maintained at 20 °C dry bulb temperature and 50% RH. The office is open from 8:00 am till 1:00 pm when employees leave for a lunch break. Calculate the following:

- Total heat gain rate due to occupants at 10:00 am.
- Total and latent heating loads due to ventilation if the outside fresh air is available at 5 °C dry bulb temperature and 60% RH.

**Question 2. [4 points]** A solid wall consists of firm stone of 30 mm thickness, concrete of 100 mm thickness ( $\rho = 2300 \text{ kg/m}^3$ ), polystyrene layer of unknown thickness, cement bricks with air gaps of 70 mm thickness ( $k = 0.90 \text{ W/m.K}$ ), cement plaster of 20 mm thickness ( $k = 1.25 \text{ W/m.K}$ ). if the wall is to satisfy the Jordanian code with an overall heat transfer coefficient of  $0.57 \text{ W/m}^2\text{.K}$ , how much should be the insulation thickness?

**Question 3. [3 points]**

A Jordanian family of six members with low hot water consumption at 50 °C, assume that the supply cold water temperature is 15 °C, and the boiler is required to heat the water in two hours, the boiler capacity is?

**Question 4. [7 points]**

Outside air at 38 °C dry bulb temperature and 60% relative humidity enters a cooling and dehumidifying device at a volumetric flow rate of  $3800 \text{ m}^3/\text{h}$ . The air leaves the device at 90% relative humidity. The inside design condition is 26 °C and 45% relative humidity. The sensible heat ratio is 0.75 (assume 100% fresh air)

- Sketch the process on the psychrometric chart, and calculate the following
- Apparatus dew point.
- Dry bulb and wet bulb temperatures of the supply air.
- Cooling capacity of the air conditioner.
- Amount of moisture removed.
- Mass of chilled water for the cooling coil, if the supply and return temperatures from the chiller are 7°C / 12°C respectively