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| **Benha University** | **Air Conditioning** |
| **Faculty of Engineering at Shoubra** | **4th Year (Power)** |
| **Mechanical Engineering Department** | **Sheet: 2 A/C** |

1. Moist air at state of $10℃ dbt$ and $8℃ wbt$ is to be sensibly heated to$ 25℃$. Find:
2. Specific humidity,
3. Relative humidity before and after heating,
4. Heat added to air.
5. $3000 m^{3}/hr$ of outside air at $10℃ dbt$ and $45\% RH$, shall be heated, so that it reaches $25℃ dbt$ and $50\% RH$. How much water must be evaporated into the air?
6. Determine the heat, which is necessary for heating $5000 m^{3}/hr$ of air at $T\_{1}=8℃$ up to $T\_{2}=25℃$ if $75 kg/hr$ of water shall be added, while$RH\_{1}=20\%$.
7. $350 m^{3}$ of air at $T\_{1}=32℃$ and $RH\_{1}=95\%$ shall be cooled down to $T\_{2}=20℃$ and dried to $RH\_{2}=60\%$. Determine the quantity of water removed.
8. In evaporative cooler. Air enters an evaporative cooler at 1 atm, 35 °C, and 20 percent relative humidity, and it exits at 80 percent relative humidity. Determine (a) the exit temperature of the air and (b) the lowest temperature to which the air can be cooled c) water temperature.
9. Moist air at $60℃ dbt and 32℃ wbt$ mixes adiabatically with moist air at $5℃ dbt$and$ 0.5℃ wbt$. If the mass of the two air streams are 3 kg and 1 kg respectively. Find the enthalpy, specific humidity and $dbt$ of the mixture.
10. Saturated air leaving the cooling section of an air-conditioning system at 14°C at a rate of 50 m3/min is mixed adiabatically with the outside air at 32°C and 60 percent relative humidity at a rate of 20 m3/min. Assuming that the mixing process occurs at a pressure of 1 atm, determine the specific humidity, the relative humidity, the dry-bulb temperature, and the volume flow rate of the mixture.
11. An air-conditioning system is to take in outdoor air at 10°C and 30 percent relative humidity at a steady rate of 45 m3/min and to condition it to 25°C and 60 percent relative humidity. The outdoor air is first heated to 22°C in the heating section and then humidified by the injection of hot steam in the humidifying section. Assuming the entire process takes place at a pressure of 100 kPa, determine (a) the rate of heat supply in the heating section and (b) the mass flow rate of the steam required in the humidifying section.
12. Discuss briefly the different cases for air washer
13. Which of the following statements are TRUE or False?
14. During sensible cooling of air, both dry bulb and wet bulb temperatures decrease.
15. During sensible cooling of air, dry bulb temperature decreases but wet bulb temperature remains constant.
16. During sensible cooling of air, dry and wet bulb temperatures decrease but dew point temperature remains constant.
17. The cooling and dehumidification process occurs when air passes over a dry surface which is at a temperature smaller than the dry bulb temperature of the air, but larger than the dew point temperature of the air.
18. The cooling and dehumidification process occurs when air passes over a surface which is at a temperature smaller than the dry bulb temperature & dew point temperature of the air.
19. The cooling potential for evaporative cooling is dependent on the wet bulb depression.
20. The evaporative cooler can be used in extremely hot and humid climates.