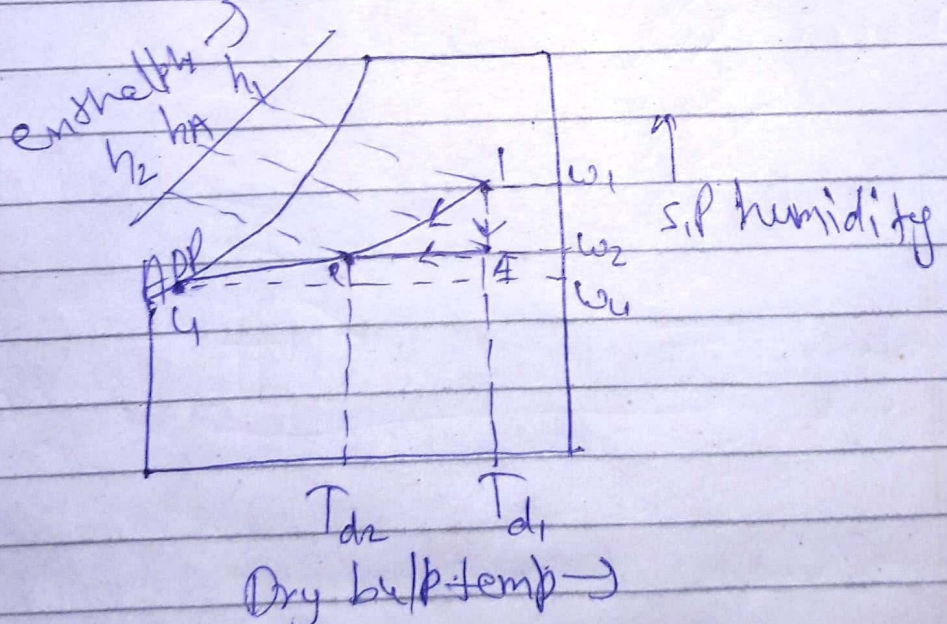
17/6/2020 RHC

CT-2

Ans-3 :-

(a) Cooling and dehumidification :-

In this process the dry bulb temperature as well as the specific humidity of air decreases the final relative humidity of the air is generally higher than that of the entering air.
The effective surface temperature of the coil is known as apparatus dew point (ADP)



T_{d1} = Dry bulb temperature of air entering the coil
T_{dp_1} = Dew point temperature of the entering air = T_{dp}
T_{d4} = effective surface temp or ADP of the coil

$$Q = h_1 - h_2 = (h_1 - h_A) + (h_A - h_2)$$
$$= LH + SH$$

$LH = h_1 - h_A$ = Latent heat removed

$SH = h_A - h_2$ = Sensible heat removed.

SHF = sensible heat factor.

$$SHF = \frac{\text{Sensible heat}}{\text{Total heat}} = \frac{SH}{LH+SH} = \frac{h_A - h_2}{h_1 - h_2}$$

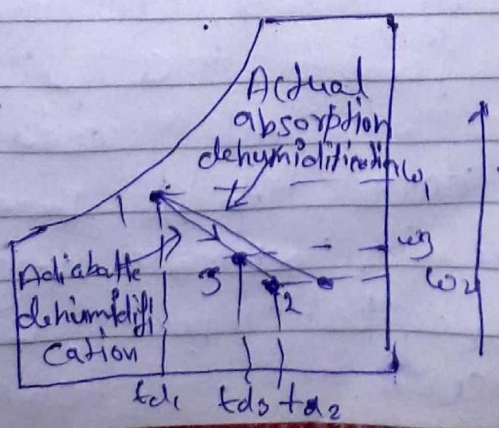
Heating and dehumidification :-

In this process, the air is passed over chemicals which have and affinity for moisture.

As the air comes in contact with these chemicals, the moistures gets condensed out of the air and gives up its latent heat.

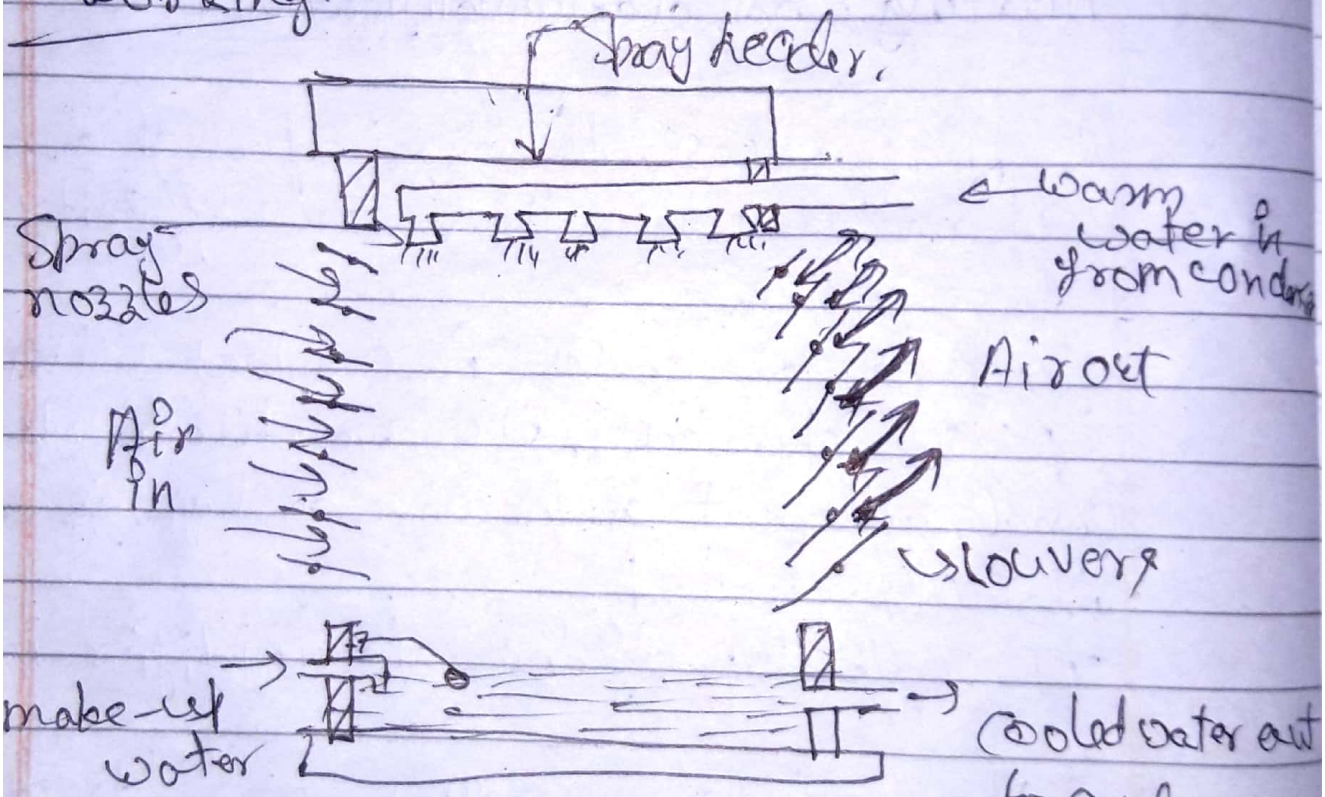
The effectiveness of the dehumidifier is :

$$\eta_H = \frac{\text{Actual increase in DBT}}{\text{Ideal increase in DBT}} = \frac{T_{d3} - T_{d1}}{T_{d2} - T_{d1}}$$



Cooling tower :- The atmospheric natural draft cooling tower consist of a box-shaped structure with louvers.
The louvers allow the atmospheric air to pass through the tower but slant down towards the inside of the tower to retain water in it.

Working :-



In this type of cooling tower, warm water from the condenser is pumped to a spray header provided at the top of tower. It is sprayed down into the tower through the nozzles. Therefore a spray nozzle having finer spray pattern is essential for good performance of cooling tower.