DESIGN FOR CLIMATE

THE BUILDINGS INAPPROPRIATE TO AUSTRALIAN CLIMATE CONDITIONS

- LACK OF EAVES TO SHADE WALLS / WINDOWS
- USE OF LARGE PICTURE WINDOWS.

THE DESIGN OF BUILDING THAT MAY WORK WELL THERMALLY IN ONE CLIMATE REGION CAN CAUSE OVER HEATING IN OTHER REGION.

DARK COLOURED BRICK → VENEER WALLS
DARK TILED ROOFS → } VERY HOT IN SUMMER

THE WAYS TO IMPROVE THERMAL CONDITION IN BUILDING

- USE OF VERANDAH TO SHADE WALLS & WINDOWS
- USE OF VENTED ROOF SPACES & ELEVATED FLOORS TO ALLOW COOLING BREEZES IN TO BUILDING

AUSTRALIAN CLIMATE

TEMPERATURE RANGE 9C ⟶ 43C

½ OF LANDMASS IN TROPICAL ZONE

MOST OF THE POPULATION RESIDE IN TEMPERATE CLIMATE ZONE.

THE ONLY BROAD CLIMATE NOT REPRESENTED IN AUSTRALIA IS COLD CLIMATE.

CLIMATE VARIABLES

TEMPERATURE, HUMIDITY, AIR SPEED, SOLAR RADIATION ARE VARIABLES FOR CLIMATE CONDITION.

AUSTRALIAN CLIMATE CONDITIONS

SUMMER

WARM ⟶ HOT IN SUMMER
COOL ⟶ COLD IN WINTER

TEMPERATURE VARIATION IS DUE TO HEATING EFFECT OF SUN AND IT DEPENDS ON SEA AND ALTITUDE.

BECAUSE OF HIGH HUMIDITY, HEAT CAN NOT BE EASILY DISSIPATED FROM THE BODY CAUSING DISCOMFORT WITHOUT PROVIDING HUMIDITY CONTROL, THE USE OF EVAPORATIVE COOLING MAY NOT BE EFFECTIVE

CONVECTION, EVAPORATION HEAT TRANSFER IS GREATLY INCREASED WHEN AIR IS MOVING.

WINTER

WINTER SUN SHINE ⟶ SOLAR HEAT GAIN FOR HEATING

INSULATION ⟶ REDUCE RATE OF HEAT GAIN

THERMAL MASS ⟶ AFFECT THE RATE AT WHICH INTERNAL TEMPERATURE CHANGE IN RESPONSE TO EXTERNAL CHANGE IN TEMPERATURE (OR) HEATING/COOLING

VENTILATION IMPROVES THE COOLING EFFECT

WINDOWS AFFECT THE AMOUNT OF AIR MOVEMENT

ORIENTATION/GLAZING ⟶ ABILITY TO EXCLUDE THE SUN IN SUMMER. ALLOW IT TO PENETRATE IN WINTER.

THERMAL COMFORT INSIDE BUILDING

HEAT EXCHANGE PROCESS ⟶ THERMAL COMFORT

HEAT ABSORBING GLASS WINDOW ⟶ QUITE HOT
RADIATE HEAT IN TO ROOM

COMFORT CONDITION IS DETERMINED BY AIR MOVEMENT AND AIR TEMPERATURE

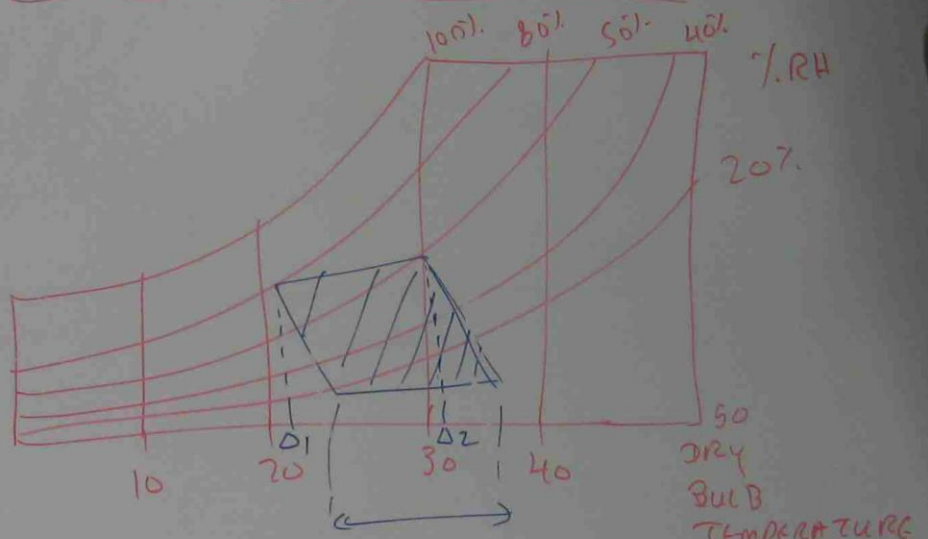
QUANTIFYING COMFORT

THERMAL NEUTRALITY $T_n = 17.6 + 0.31\ T_{AUG}$

$18.5 < T_n < 28.5^{\circ}C$

ALLOWANCE : $\pm 2^{\circ}C$

ALLOCATING TEMPERATURE RANGE AND HUMIDITY RANGE ON PSYCHOMETRIC CHART



OPERATING POINT OF AIR CONDITIONING SYSTEM

%RH & T_m MEETING POINT

UPPER TEMPERATURE LIMIT = $T_m + 2$

LOWER TEMPERATURE LIMIT = $T_m - 2$

$$\Delta_1 = \frac{T_m - 2}{40} \times AH(T_m - 2)$$

$$\Delta_2 = \frac{T_m + 2}{40} \times AH(T_m + 2)$$

AH = ABSOLUTE HUMIDITY