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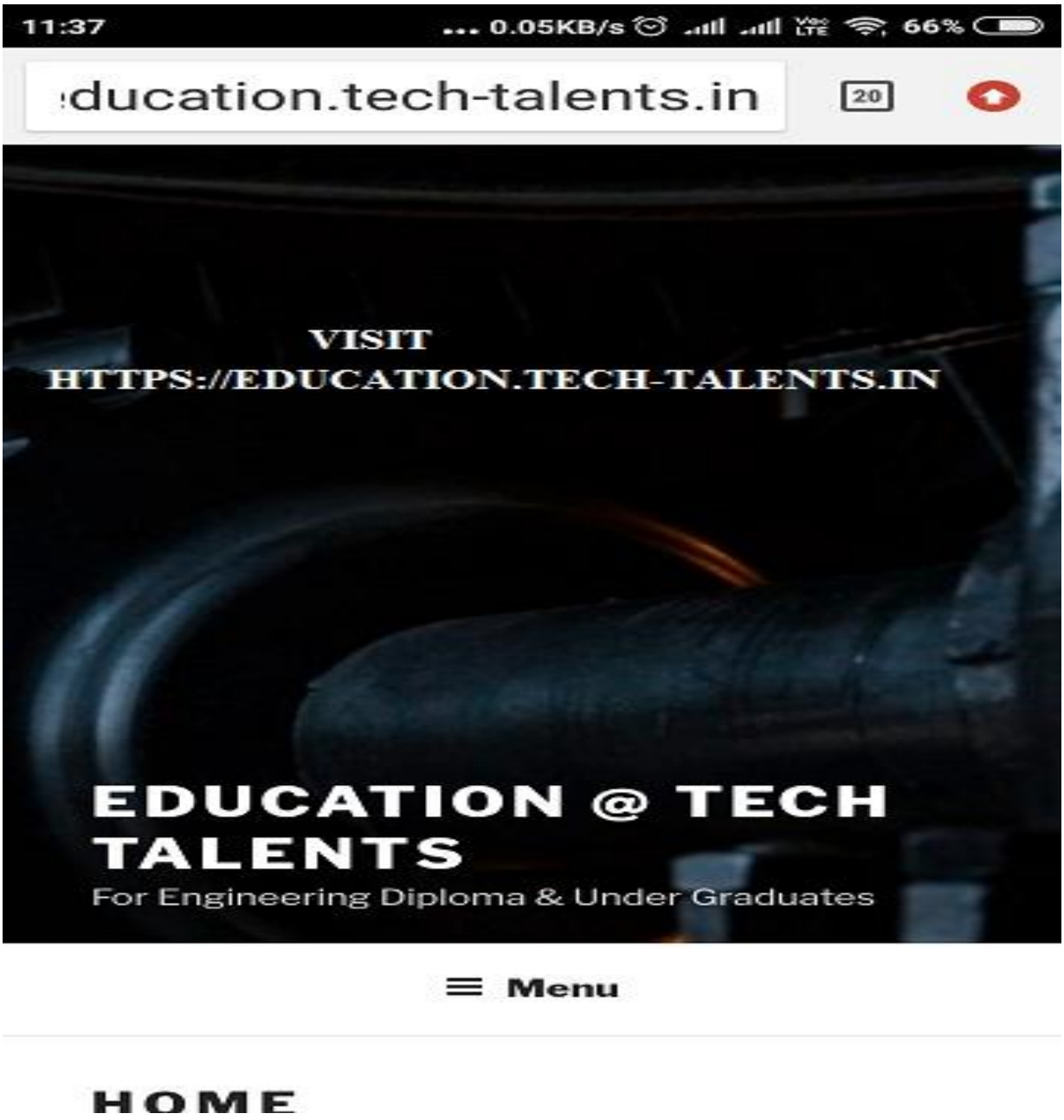


~~Objective~~ UNIT-V

Air Conditioning systems: Classification of equipment, Cooling, heating humidification and dehumidification.
Air Conditioning filters, Grills & Registers Deodorants, Fans and Blowers, Heat Pump Heat Sources - different heat pump Circuits Applications.

AIR FILTERS:-

Depending on the nature of the dust, Type of dust and required cleanliness in the air-conditioned space, the filters are broadly classified into five groups. as given below

1. Dry-Filters
2. Viscous Filters
3. Wet filters
4. Electric Filters
5. Centrifugal dust collectors.

6. Performance of Air-filters

$$\eta = \left(\frac{m_1 - m_2}{m_1}\right) \times 100.$$

Fans and Blowers:-

1. Axial Flow Fans
2. Centrifugal Fans

Fan Horse Power and Efficiency

$$\eta_f = \frac{\text{Fan output in B.P}}{\text{Input in B.P}} = \frac{Q_a V H_t}{1000} \times \frac{1}{(B.P)}$$

Fans from Different Manufacturers:-

1) Vane-Axial Fans
2) Dual flow Fans
3) Utility Blower
4) Portable Air Cooler
5) Duct Fans
6) Axial Fans
7) Fibreglass Fans.

Grills and Registers:-

Grill:- A decorative covering for an outlet or intake is known as grill.

Damper:- The Grill provided with damper is known as Register.

Proper air supply to an air-conditioned room is made through grills or registers. The grill or register can be located in the floor, high side of the wall or in the ceiling. The essential requirement of the supply point is that the air stream coming out should not strike the occupants before it has lost its high velocity

Air Conditioning of Multi Storied buildings.

1) They use highly centralized air conditioning equipment
2) Either roof and basement are the usual choice for these central station systems
3) The basement has the the advantage of easy utility connections, noise isolation & low cost rental area
4) The roof is the ideal location for fresh air intakes and heat rejection to the atmosphere
5) Cooling tower are noisy produce very hot and humid exhaust air, so the best location for cooling tower is placed on the roof.

① All Air System

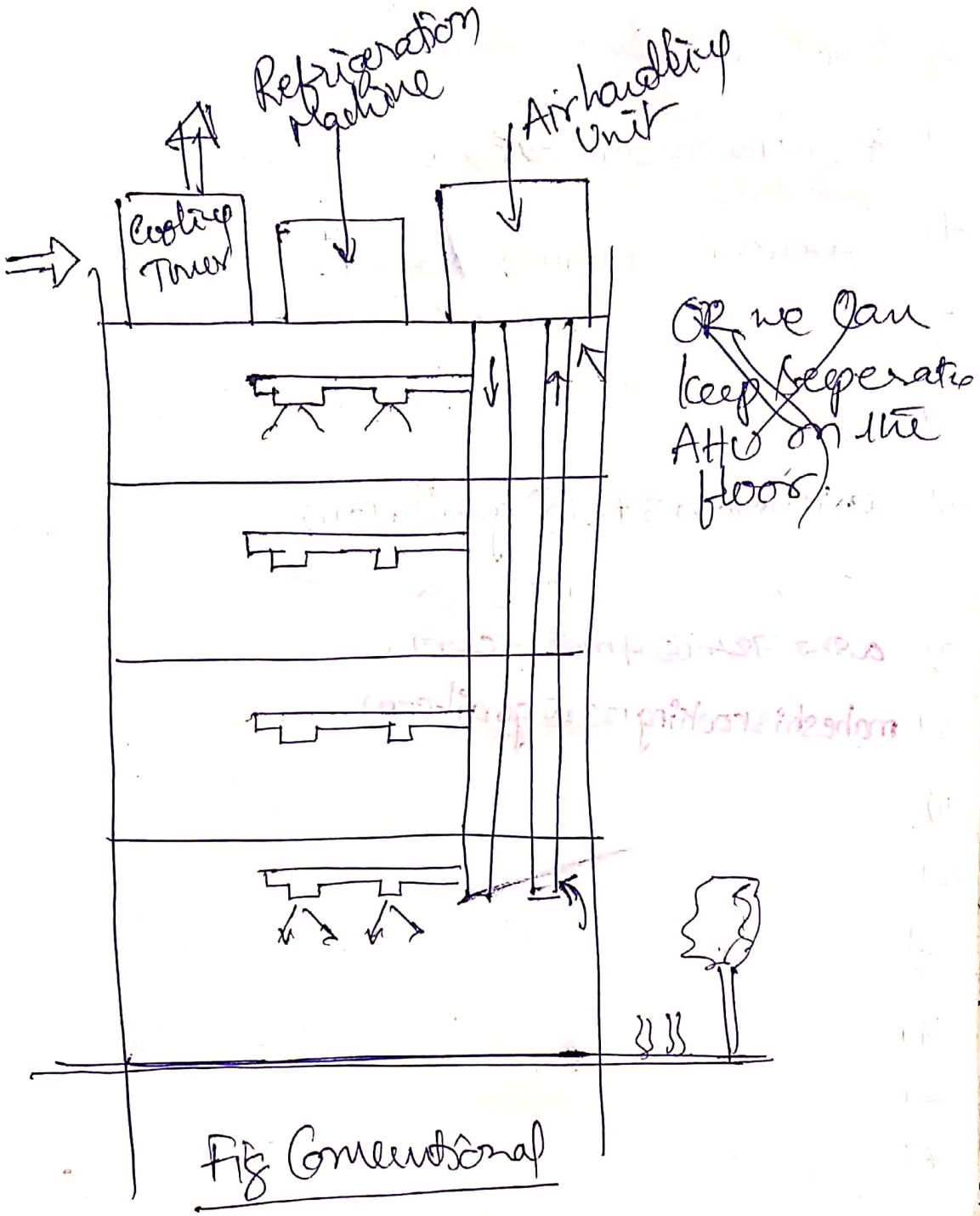


Fig Conventional

In all Air System, Single Central Air Conditioning System on the roof

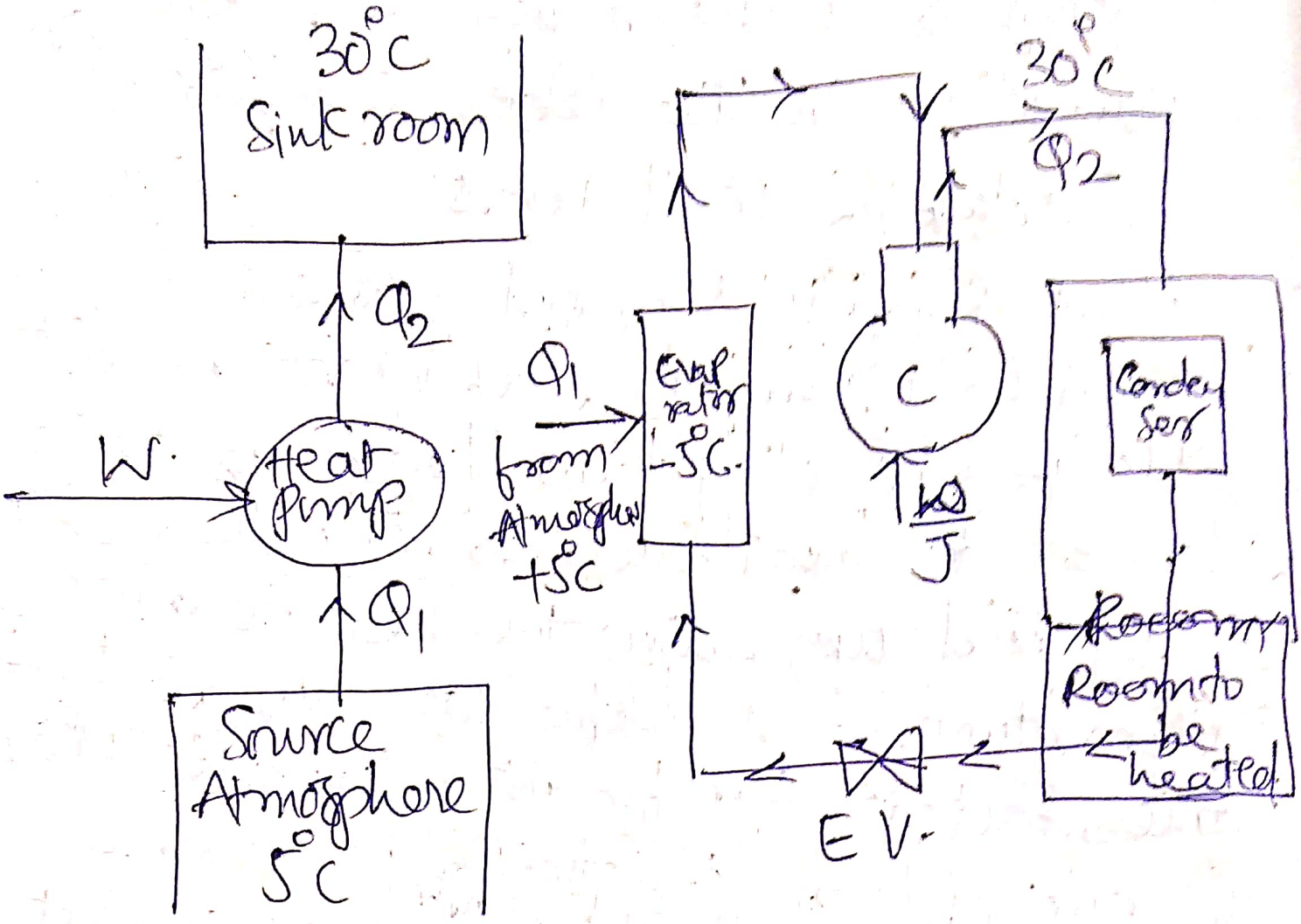
UNIT-V HEAT PUMP CIRCUITS

Different type of Heat Pump circuits are :-

1) Air-to-Air
   a) Fixed Air-circuit Heat Pump
   b) Fixed Refrigerant circuit.
2) Water to Air Design
3) Air to Water Design
4) Water to Water Design.
5) Air to Liquid Design.

Industrial Applications of Heat Pump

1. Purification of water
2. Concentration of juices, Milk & Sugar Syrup
3. Purification of Salty water from Sea sources
4. Concentration of dyes & chemicals
5. Use for preparing powdered milk & Table salt
6. Recovery of solvents from different manufacturing process
7. For year round air Conditioning



Heat Pump & Circuit

Heat Pump

Heating is a major part of the energy consumption in the colder countries

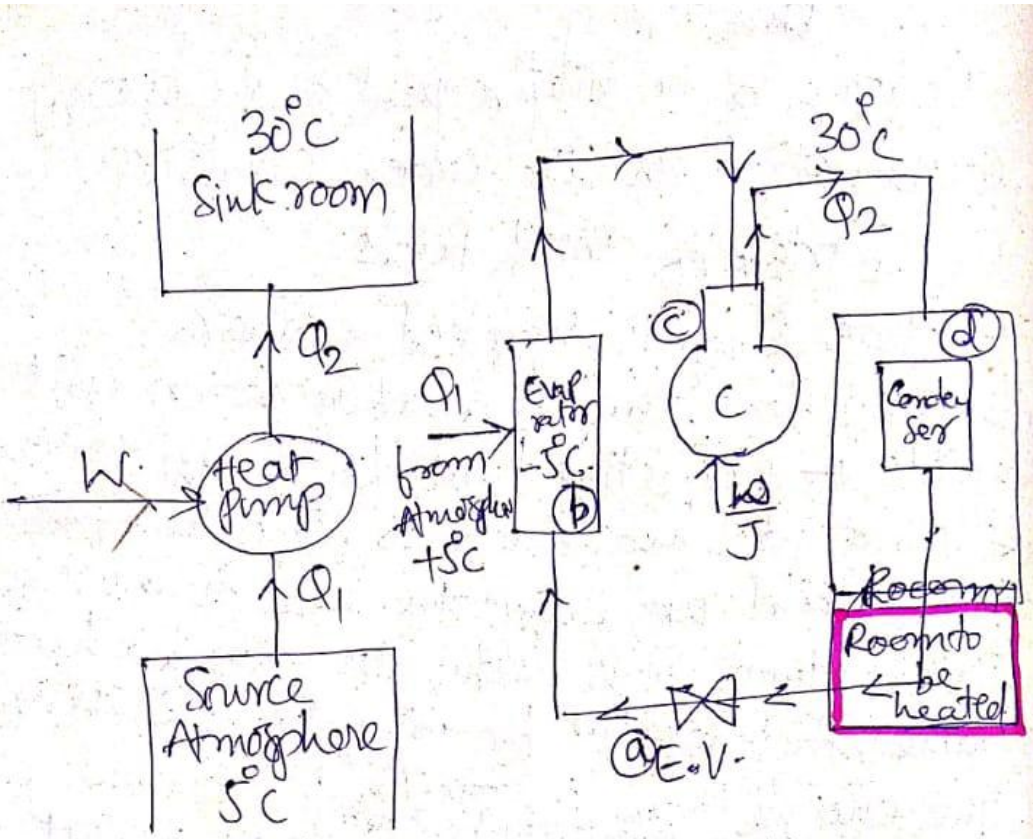
Shortage of fossil fuels.

Heat Pump is suggested answer

Basically heat pump is a refrigeration unit capable of extracting heat from any source of low grade heat such as atmosphere, sea ground and upgrading the heat to a useful temperature. It is useful not only for heating homes, factories but for many industrial purposes

The energy from practically inexhaustible sources (such as water, ambient air) may be ~~exploited almost without cost instead of~~ and elevated to higher temp as ~~required~~ per the requirement of applications

In the heat pump system the medium changes from liquid to vapour and back during the cycle. Thus in the process much more energy is exchanged than is needed to drive the pump



Heat Pump & Circuit

The heat pump is a primarily a refrigerent cycle using heat sources as atmosphere, sea and ground This absorbed heat from the unusable sources is upgraded with the help of compressor and, the fluid carrying the heat dissipates at required places through the condenser of the refrigeration system.

(a) The refrigerant coming out of expansion valve absorbs heat Q_1 from atmosphere as its temperature (-5°C) is lower than the atmospheric temperature (+5°C) in the evaporator (b)

(c) This absorbed heat by refrigerant is upgraded by adding the work through compressor and the total heat becomes $\boxed{Q_2 = Q_1 + W}$;

(d) This heat is dissipated in the room through condenser.

This refregerant cycle is used for heating purpose only when the atmospheric temperature is below the required temperature for comfort which is known as "Heat Pump"

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THANK YOU

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