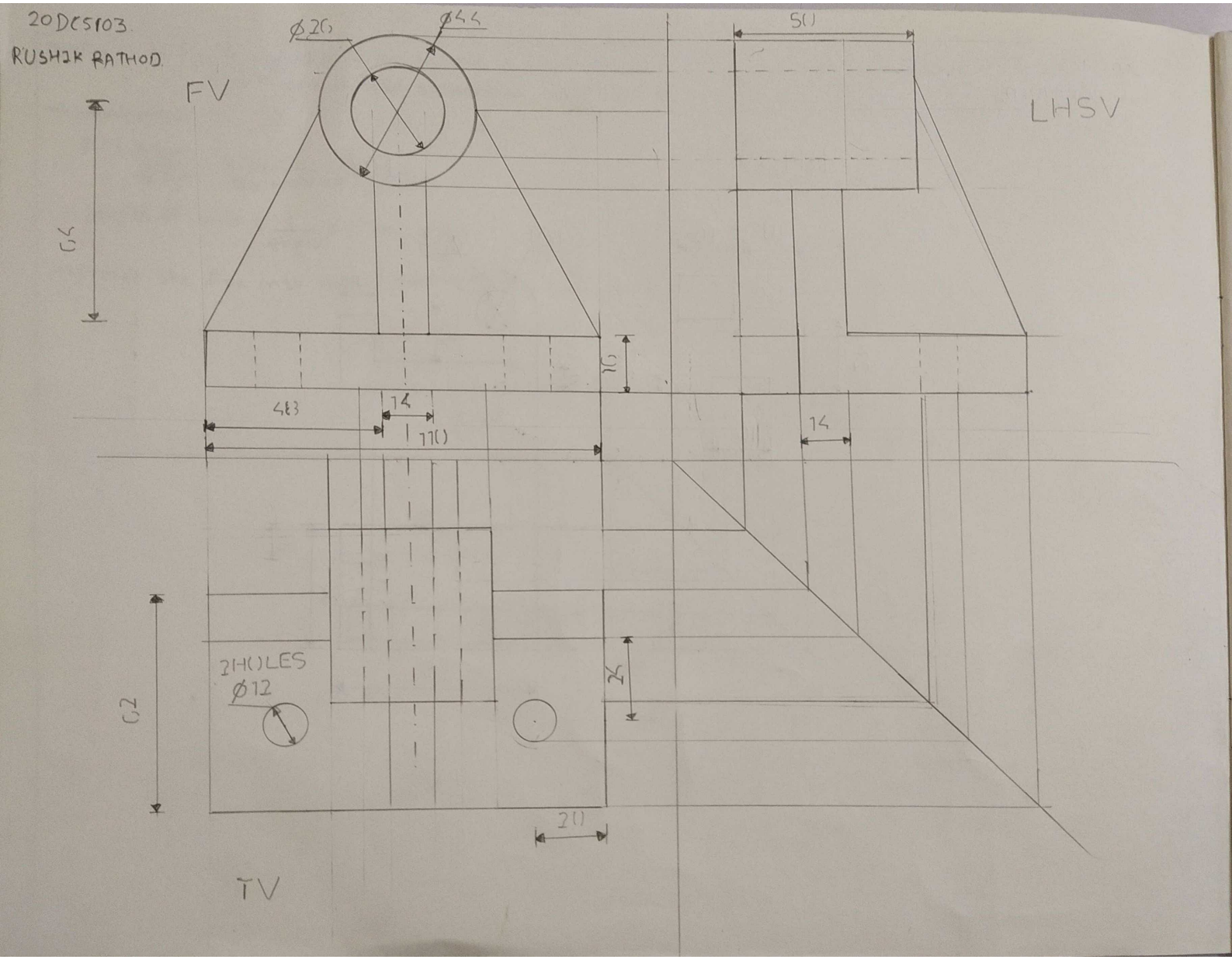
20DCS103
RUSHIK RATHOD



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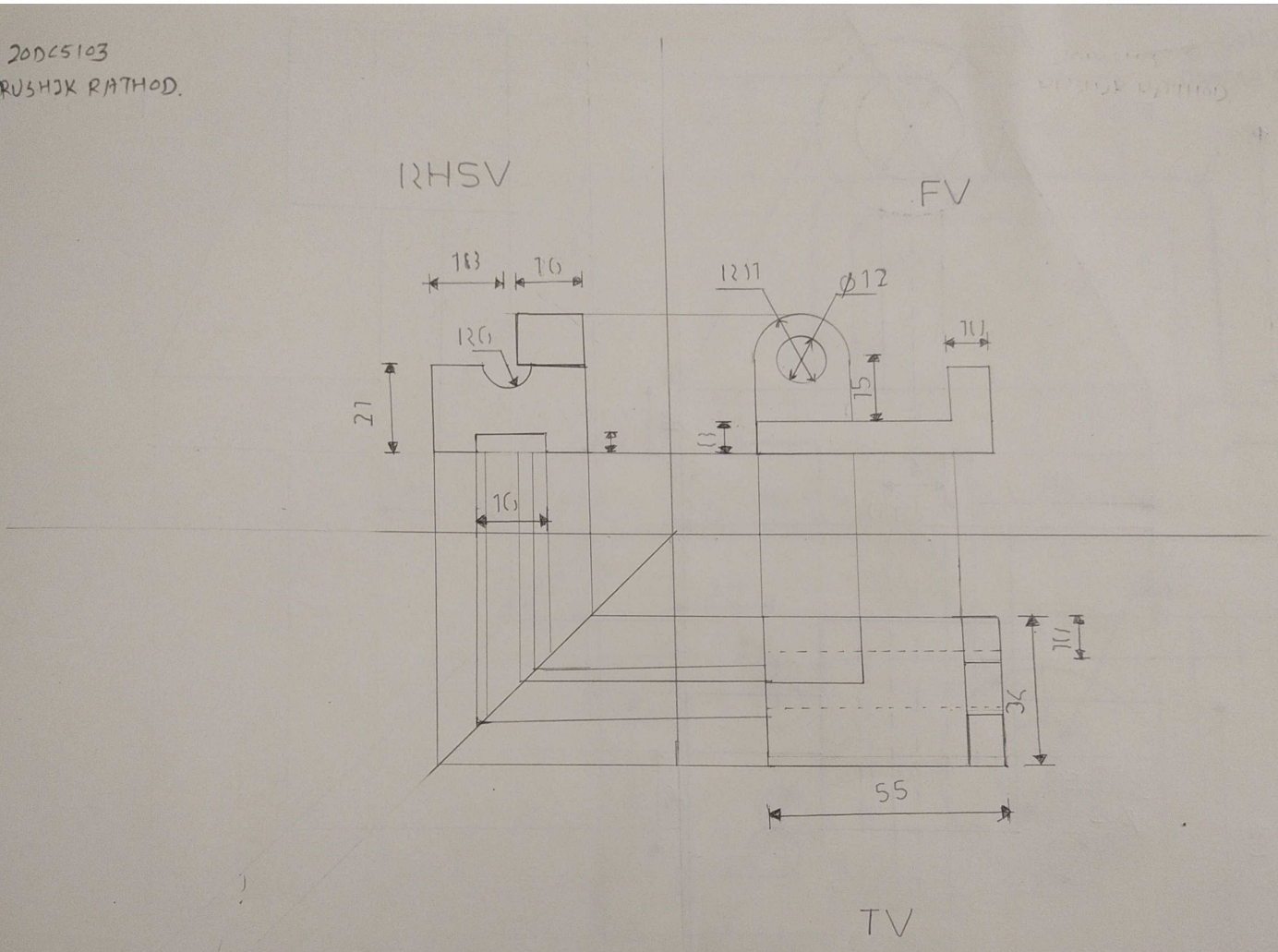

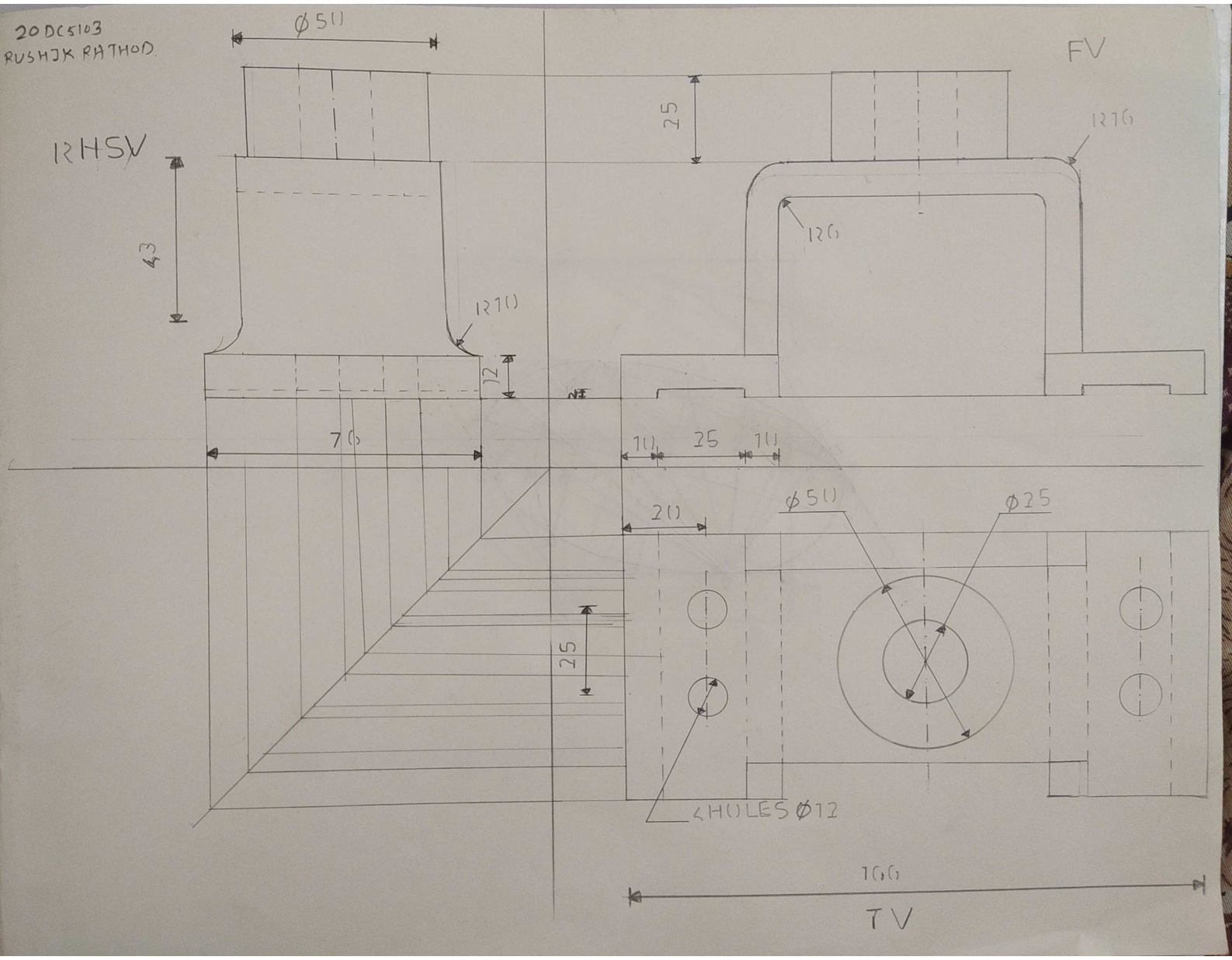
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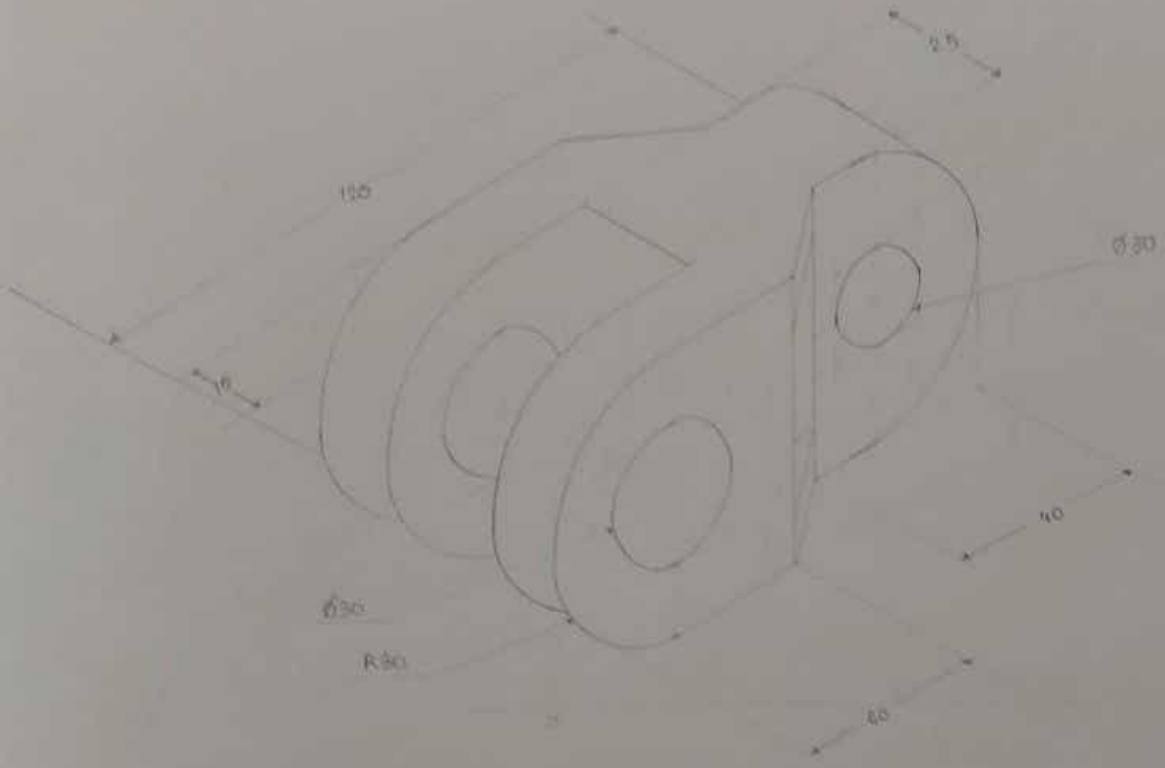

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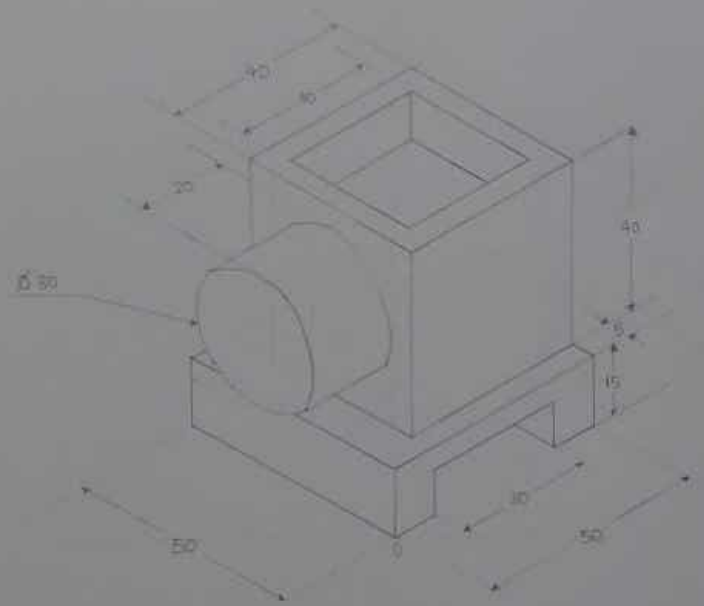

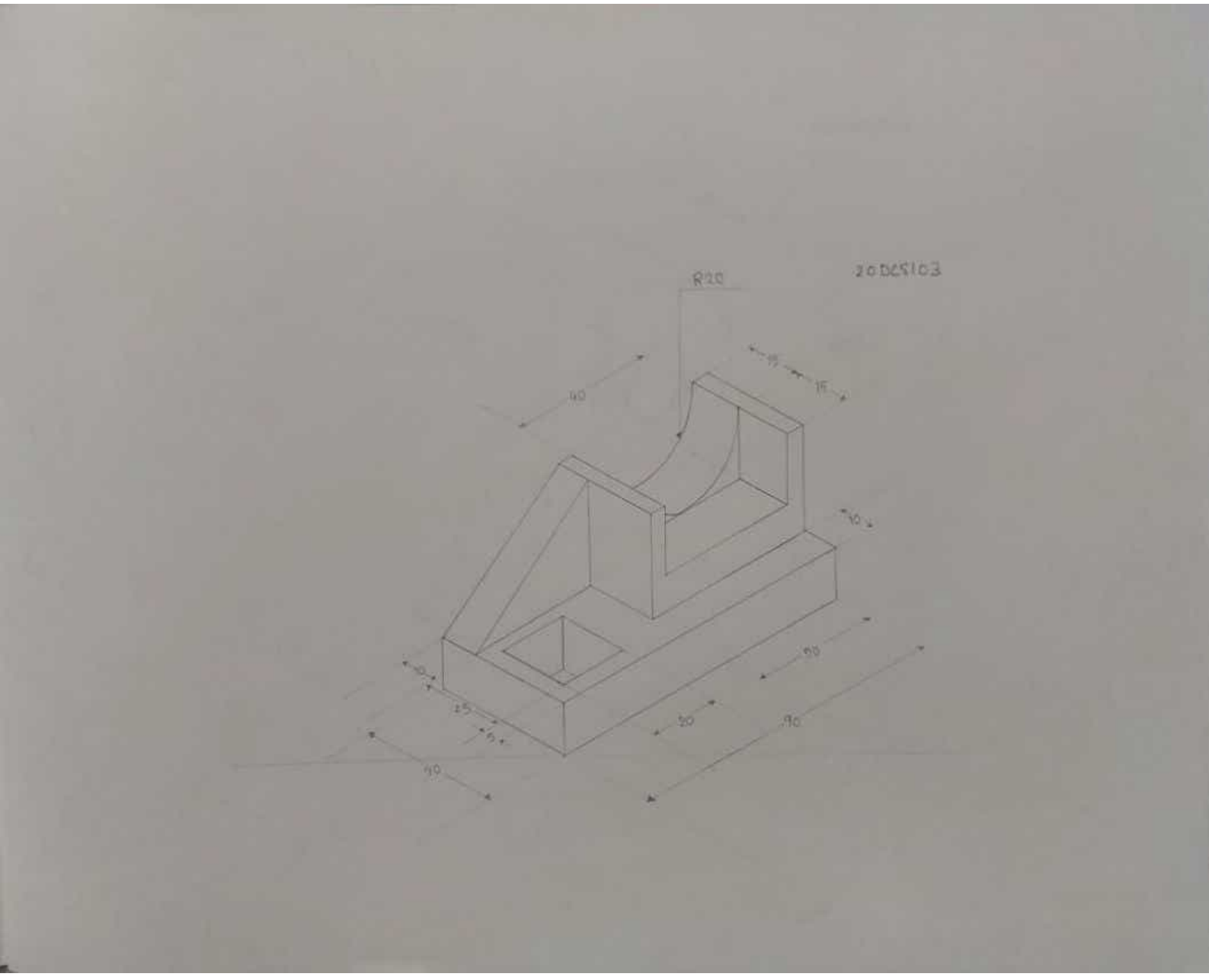
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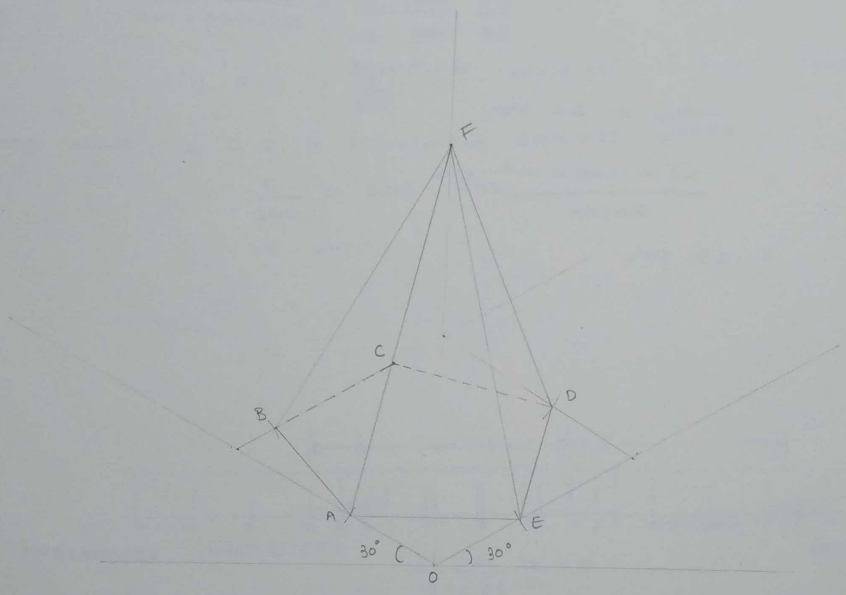
20DCS103

*) A Pentagonal pyramid of side of base 30 mm and height 70 mm is resting with its base on HP. Draw the isometric drawing of the pyramid.



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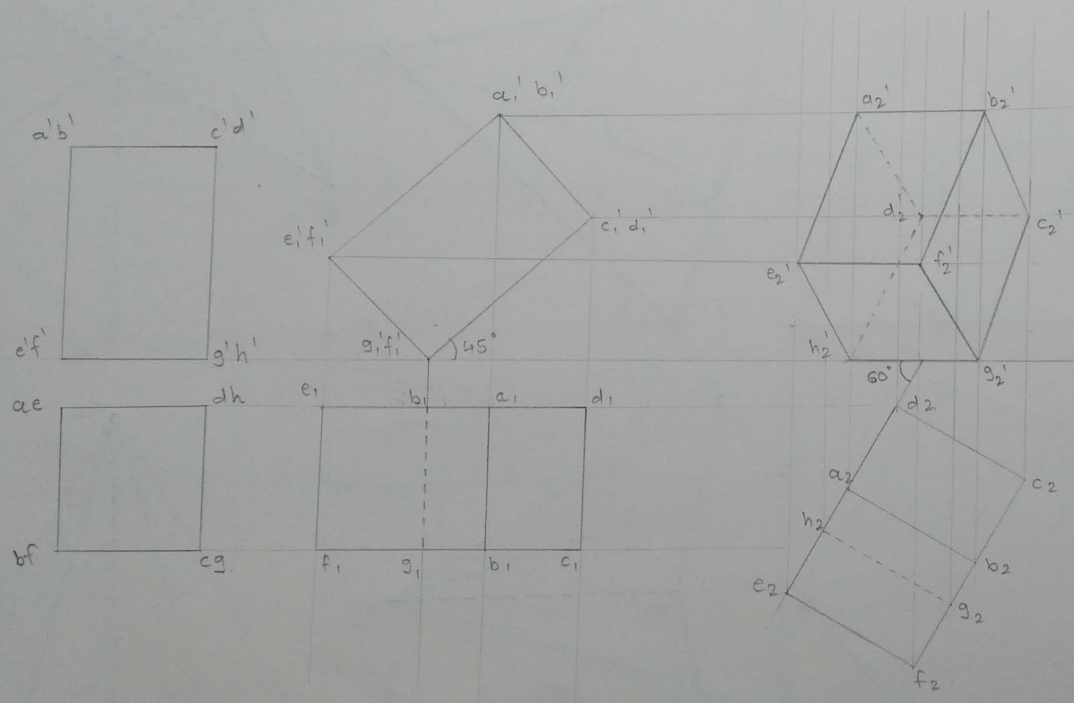
1. A square prism side of base 30 mm and hight 45 mm is resting on HP on one of the edges of the base. The side on which it rests on HP makes 45° with VP. Rectangular face containing that edge on which rests on HP makes an angle 60° with HP. Draw the projections of prism.



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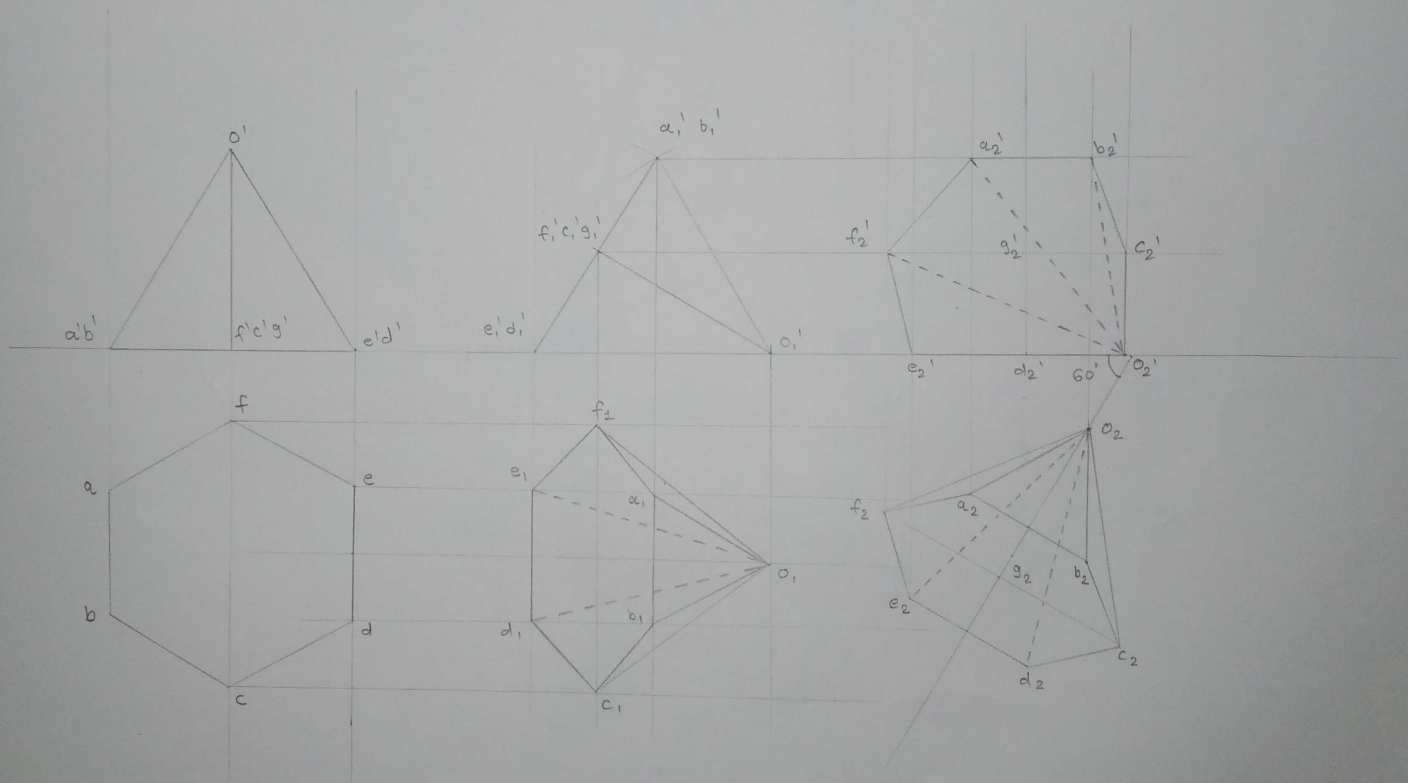
2. A hexagonal pyramid of 30 mm side of base and 45 mm length of axis is resting on one of its triangular faces on HP. Draw the projections of the pyramid when its edge of base which is in HP is inclined at 60° to the VP.



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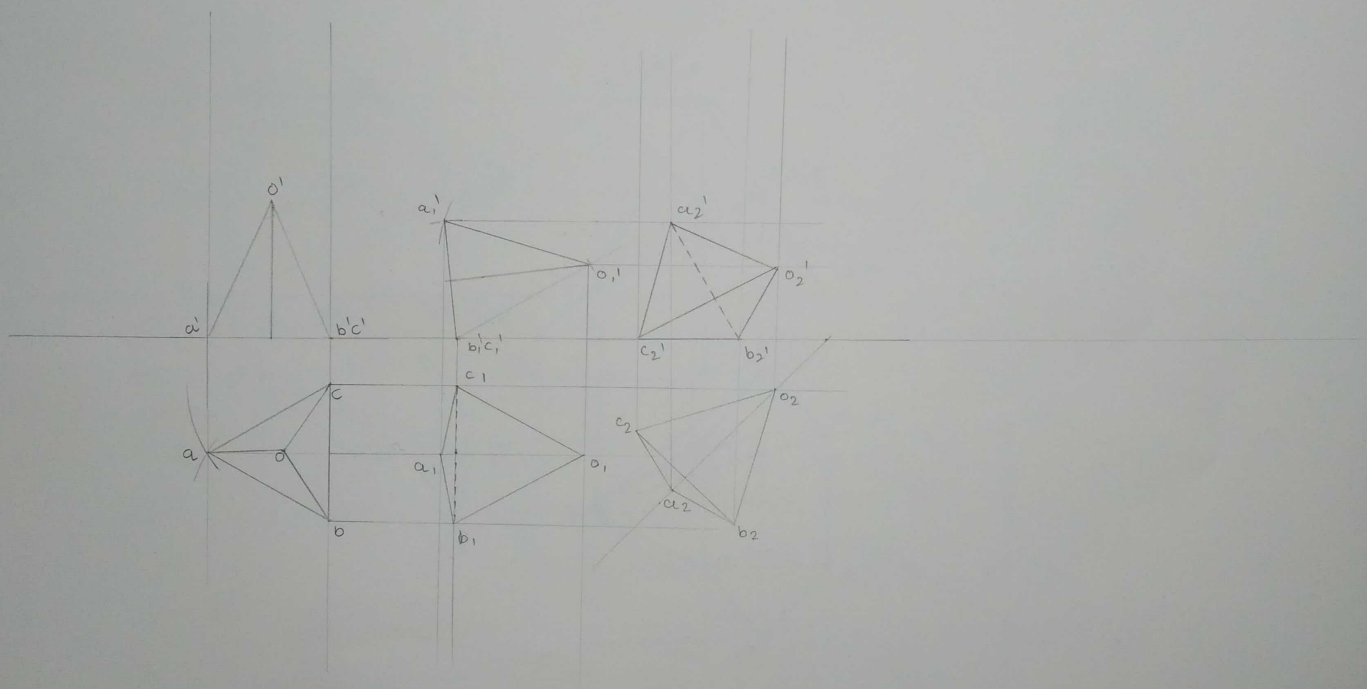
3. A tetrahedron of 30 mm side is resting with one of its edges on H.P. The edge on which it rests is inclined at 45° to V.P and a face containing that edge is inclined 30° to H.P. Draw the projections of solid.



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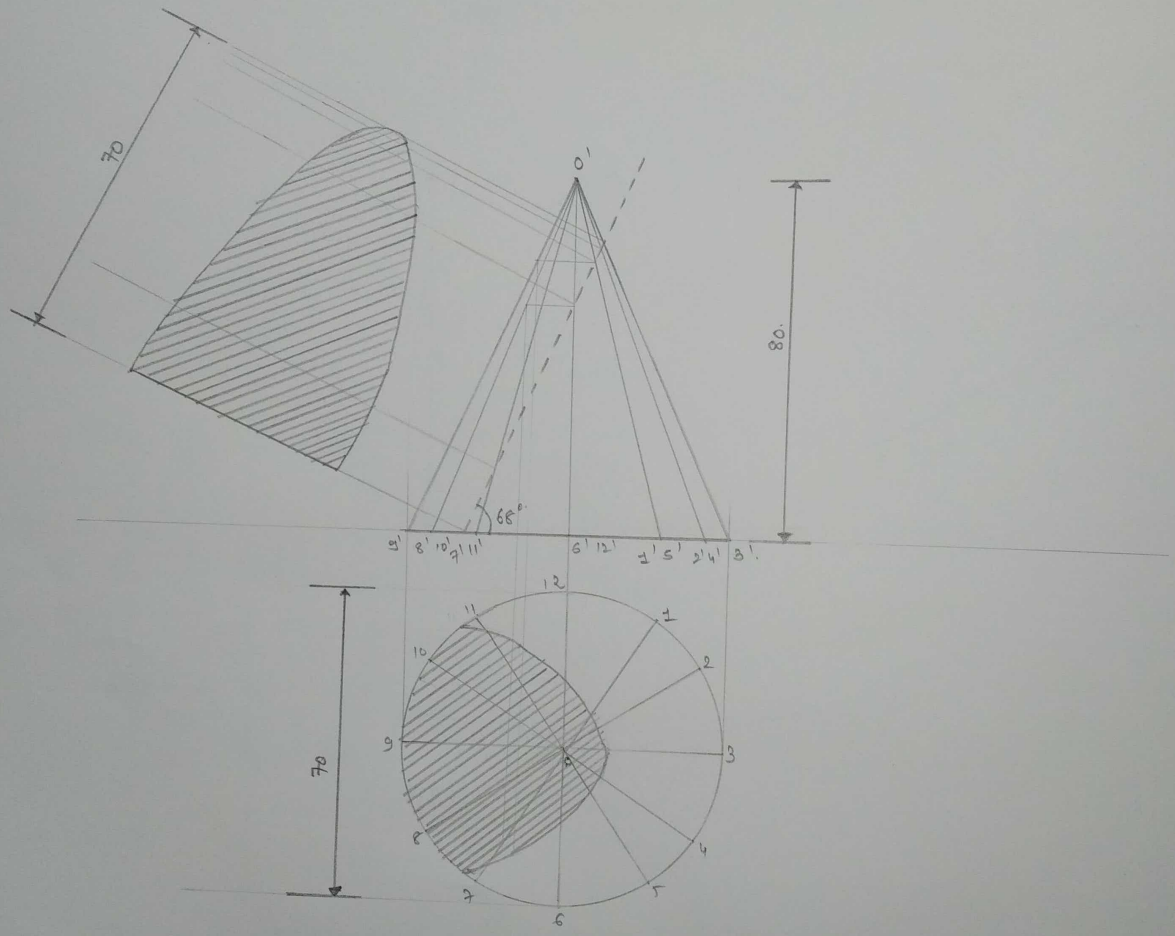
1] A cone of diameter 70 mm and 80 mm height is cut by a section plane such that the true shape of section is parabola of 70 mm axis and true shape available in plan. Find the inclination of section plane with both the reference plane and axis of cone.



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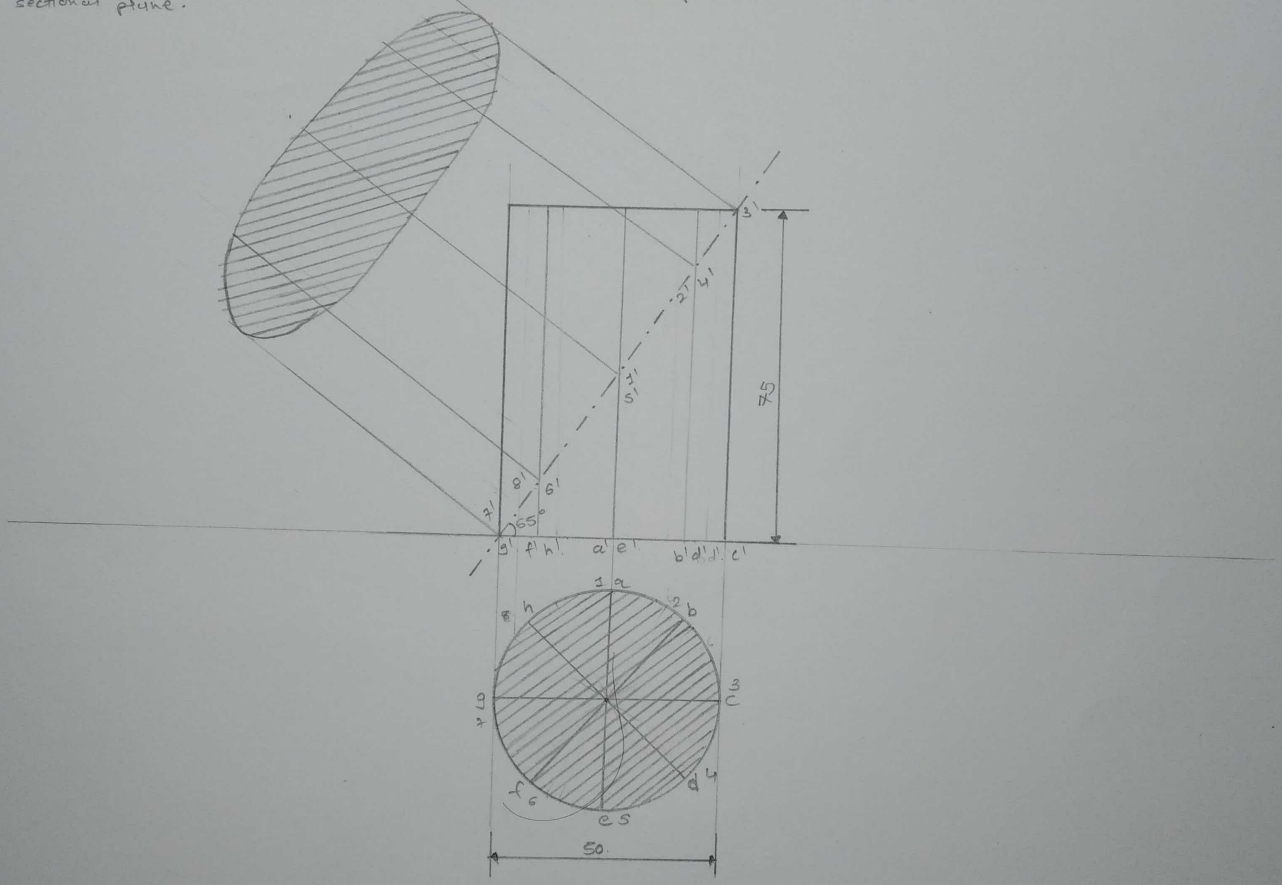
2.) A cylinder of 50 mm diameter of base and 75 mm height of axis has one of its ends on the HP. It is cut by and AIP in such a way that the true shape of the section is an ellipse of lupigest possible major axis. Draw the sectional plane, true shape and find the inclination of the sectional plane.



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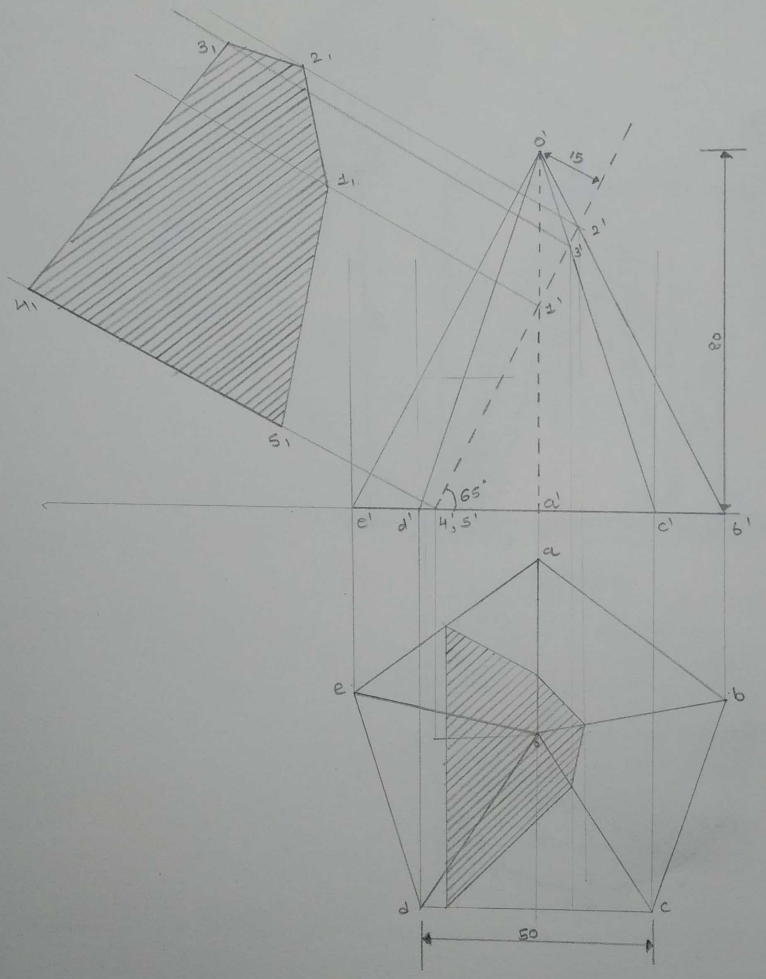
3. A pentagonal pyramid, sides of the base 50 mm and height 80 mm, is resting on HP on one of its base with one of the edges of base away from VP and is parallel to VP. It is cut by an AIP bisecting the axis, the distance of the section plane from the apex being 15 mm. Draw the elevation sectional plane and the true shape of the section. Find also the inclination of AIP.



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1) Draw a scale 1 cm = 1 m to read decimeters, to measure maximum distance of 6 m. Show on it a distance of 4 m and 6 m.

→ Representative factor [R.F.] = $\frac{\text{Dimension of drawing}}{\text{Dimension of object}}$

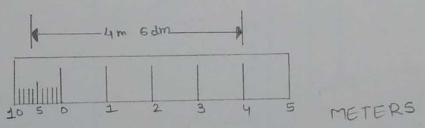
$\therefore$ R.F. = $\frac{1 \text{ cm}}{1 \text{ m}}$

$\therefore$ R.F. = $\frac{1}{100}$

→ Length of the scale = R.F. × Maximum distance

= $\frac{1}{100}$ × 600 cm

= 6 cm



DECIMETERS METERS

R.F. = $\frac{1}{100}$

20DCS103

2) In a map a 72 km distance is shown by a line 90 cm long. Calculate the R.F. and construct a plain scale to read kilometers and hectometers, for maximum 12 km. Show a distance of 8.3 km on it.

→ Representative factor [R.F.] = $\frac{\text{Length of line}}{\text{Actual length}}$

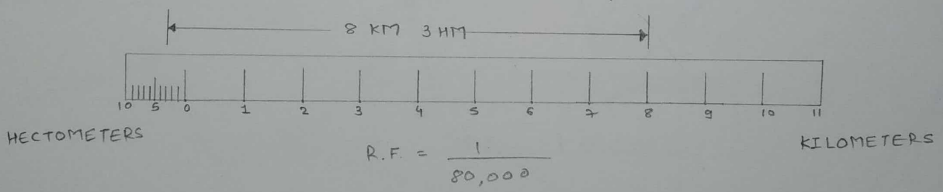
$= \frac{45 \text{ cm}}{36 \text{ km}} = \frac{45}{36 \times 1000 \times 100} = \frac{1}{80,000}$

→ Length of a scale = R.F. × Maximum distance

$= \frac{1}{80000} \times 12 \text{ km}$

$= \frac{12 \times 1000 \times 100}{80000} \text{ cm}$

$= 15 \text{ cm}$



R.F. = $\frac{1}{80,000}$

ME145 - EOE Assignment

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1. Prime mover :

Prime mover is a device which uses natural sources to convert their energy into mechanical energy or useful work (shaft power).

→ Types of prime movers :

1) Thermal : 1) Fuels (Heat engines)
2) Nuclear (Nuclear power plant)
3) Geothermal (Geothermal power plant)
4) Bio-energy (Bio-gas plant)
5) Direct solar energy.

2) Non-thermal : 1) Hydel energy (Water turbine)
2) Tidal energy (Tidal power plant)
3) Wind energy (Wind mill)

2. High grade energy :-

Energy that can be completely converted [neglecting loss] into the work.

Ex:- Mechanical work, Electrical Energy, Water power, Wind and tidal power, Kinetic energy of jet.

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Low grade energy :-
Only a certain portion of energy that can be converted into mechanical work [shaft power], that energy is called low grade energy.
Ex:- Thermal or heat energy, Heat derived from combustion of fuels, Heat of nuclear fission.

3. Similarities of work and heat.

- Both are path functions
- Both are boundary phenomenon
- Both are associated with a process, not a state
- Systems possess energy, but not work or heat.

Dissimilarities of work and heat.

- In heat transfer, temperature difference is required.
- In a stable system there cannot be work transfer, however, there is no restriction for the transfer of heat.
- Heat is low grade energy while work is high grade energy.

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4. Pressure :-

Pressure is the property of fluid and it is defined as force per unit area.

→ Standard atmospheric pressure :-

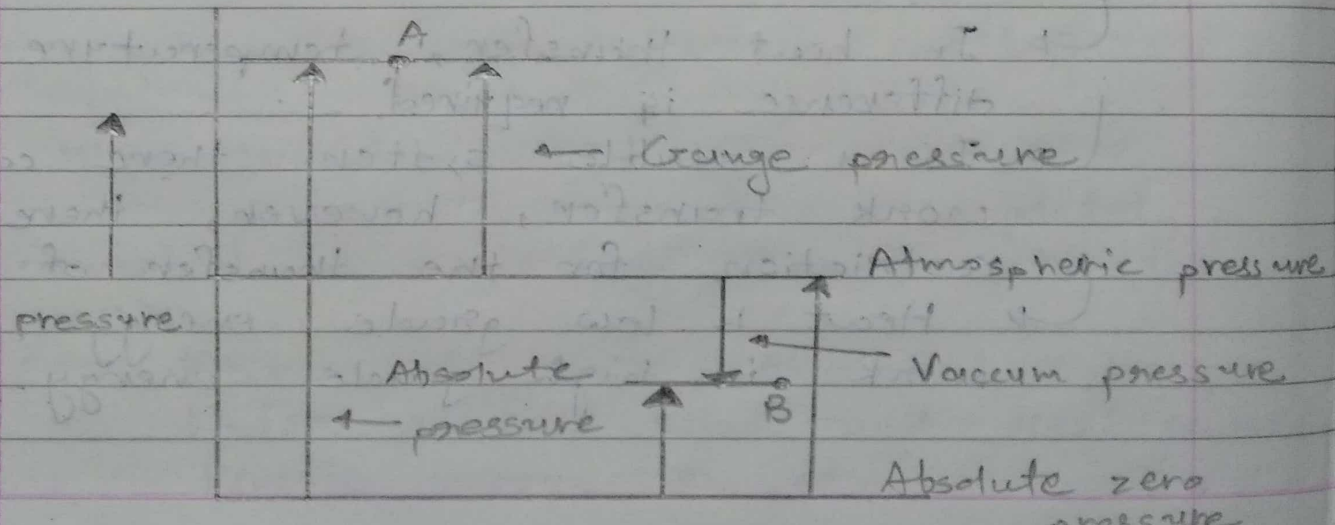
Standard atmospheric pressure is a pressure of atmospheric air at mean sea level.

→ Absolute pressure :-

Absolute pressure is measured with reference to absolute zero pressure. It is the pressure related to perfect vaccum.

→ Vaccum :-

Vaccum is defined as the pressure below atmospheric pressure.



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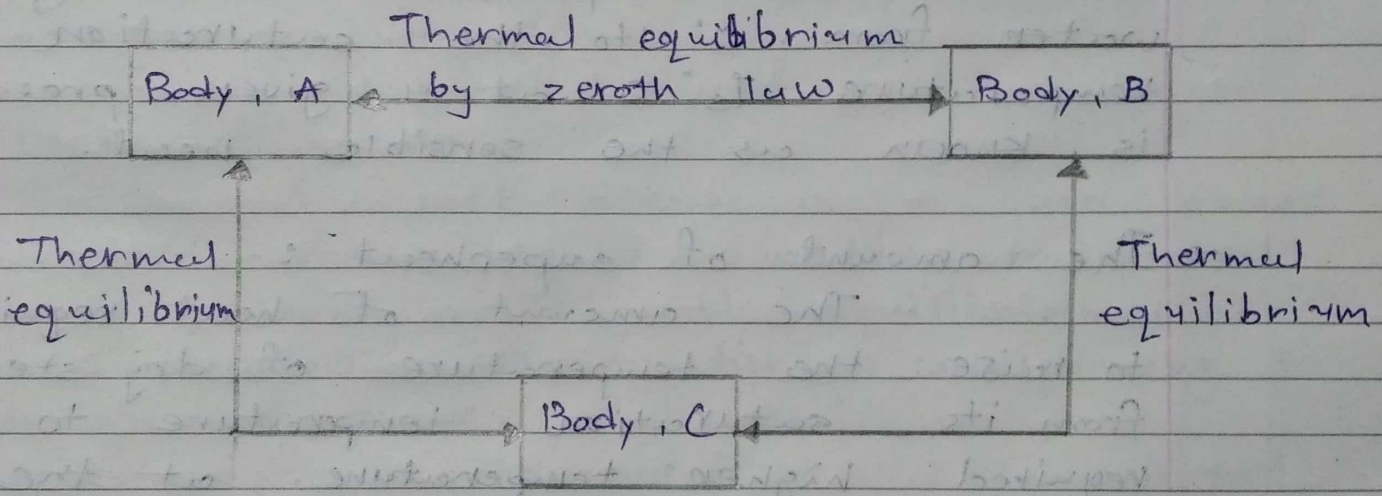
5. Zeroth Law of thermodynamics :-

→ Zeroth law of thermodynamics states that " the bodies A and B are in thermal equilibrium with a third body C separately then the two bodies A and B shall also be in thermal equilibrium with each other. "

→ This is the principle of temperature measurement.

→ Diagram :-



Zeroth law of thermodynamics

6. Saturation temperature :-
The saturation temperature is the temperature at which the water begins to boil at the stated pressure.

→ Latent heat :-
The heat being supplied does not show any rise of temperature but changes water into steam is called latent heat.

→ Sensible heat :-
The amount of heat required to raise the temperature of 1 kg of water from 0° to the saturation temperature T_s° C at a given pressure is known as the sensible heat.

→ The amount of superheat :-
The amount of heat required to raise the temperature of dry steam from its saturation temperature to any required higher temperature at the given constant pressure is called amount of superheat.

→ The degree of superheat :-
The difference between the superheated temperature and the saturation

temperature is known as the degree of superheat.

→ Dryness fraction :-

The dryness fraction is the ratio of the actual dry steam present in a known quantity of wet steam to the total mass of the wet steam.

7. Dry saturated steam :-

A steam at the saturation temperature corresponding to a given pressure and having no water molecules entrained in it is known as dry saturated steam or dry steam.

→ Wet steam :-

A wet steam is a two phase mixture of entrained water molecules and steam in thermal equilibrium at the saturation temperature corresponding to a given pressure.

8. Difference between steam boiler and steam generator :

→ A steam boiler consists only of the containing vessel and convection heating

surfaces.

→ While steam generators cover the whole unit of water wall tubes, super heaters, air heaters and economizers.

9 Comparison between water tube boiler and fire tube boiler :-

* Fire tube boiler.	* Water tube boiler
→ Hot gases are inside the tube, water outside the tube.	→ Water inside the tube and hot gases outside the tube.
→ Steam generation rate is lower.	→ Steam generation rate is higher.
→ Operating pressure limited to 25 bar	→ It can work under as high pressure as more than 25 bar.
→ Chances of explosion is less due to low pressure.	→ Chances of explosion is more due to high pressure.
→ Floor space requirement is more in fire tube boiler.	→ Floor space requirement is less in water tube boiler.

10. Boiler Mountings & Accessories :-

* Mountings :

1) Two safety valves
2) Two water level indicators
3) A pressure gauge.
4) A steam stop valve
5) A feed check valve
6) A blow off cock.
7) An attachment of inspector's test gauge.
8) A man hole.
9) Mud holes or sight holes.

* Accessories :

1) Feed pumps
2) Injector
3) Economiser
4) Air preheater
5) Super heater
6) Steam separator
7) Steam trap.

11. Comparison between I.C. engine and E.C. engine :-

*	I.C. Engine	*	E.C. Engine
1)	Combustion of fuel takes place inside the cylinder.	1)	Combustion of fuel takes place outside the cylinder.
2)	Working fluid may be petrol, diesel and various types of gases.	2)	Working fluid is steam.
3)	It requires less space.	3)	It requires large space.
4)	Power developed per unit weight of these engines is high.	4)	Power developed per unit weight of these engines is low.
5)	Fuel cost is relatively high.	5)	Fuel cost is relatively low.
6)	Thermal efficiency is high.	6)	Thermal efficiency is low.

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12. Explain the functions of following terms:-

→ Connecting Road :
It is the member connecting piston through piston pin and crank shaft through crank pin. It converts the reciprocating motion of the piston into rotary motion of the crankshaft.

→ Carburetor :
Carburetor is used in petrol engine for proper mixing of air and petrol.

→ Fuel pump :
Fuel pump is used in diesel engine for increasing pressure and controlling the quantity of fuel supplied to the injector.

→ Fuel injector :
Fuel injector is used to inject diesel fuel in the form of fine atomized spray under pressure at the end of compression stroke.

→ Spark plug :
Spark plug is used in petrol engine to produce a high density spark

for ignition of air fuel mixture in the cylinder.

13. Difference between working of Petrol engine and Diesel engine :

* Petrol Engine	* Diesel Engine
→ Petrol engine works on constant volume cycle. (otto cycle)	→ Diesel engine works on diesel cycle.
→ In carburetor, fuel gets mixed with air and then mixture enters the cylinder during suction stroke.	→ Diesel is pressurized with the help of fuel pump and then injected into the engine cylinder by the fuel injector at the end of compression stroke.
→ Compression ratio is low around 6 to 10.	→ Compression ratio is high around 14 to 20.
→ The speed of an engine is high (300 RPM)	→ The speed of an engine is low to medium (500 to 1500 RPM)

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14. Explain following terms :-

→ Dead centers :

In the vertical engines, top most position of the piston is called top dead center.

When the piston is at bottom most position, it is called bottom dead center.

→ Clearance volume :

Clearance volume is the volume contained between the piston top and cylinder head when the piston is at top or inner dead center.

→ Stroke volume :

It is volume displaced by the piston in one stroke is known as stroke volume.

Stroke volume $V_s = \frac{\pi}{4} \pi d^2 L$

where, d = Bore

L = stroke length.

→ Compression ratio :

The ratio of total cylinder volume to clearance volume is called compression ratio of the engine.

15. Difference between two stroke and four stroke cycle engines :-

* Four stroke engine.	* Two stroke engine.
→ 4 piston strokes require to complete one cycle.	→ Only 2 piston strokes require to complete one cycle.
→ The power is developed in every alternate revolution, hence heavy flywheel is required.	→ The power is developed in every revolution, hence lighter flywheel is required.
→ These engines are heavier, larger and require more space.	→ These engines are lighter, more compact and require less space.
→ Crankcase is not hermetically sealed.	→ Crankcase is hermetically sealed because charge is admitted to it.
→ Thermal efficiency is higher, because there is no mixing of fresh charge with exhaust geses.	→ Thermal efficiency is less, because there is mixing of fresh charge with exhaust gas, hence loss of fresh charge

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16. The application of refrigeration :-

1) Storage and transportation of food stuffs as dairy products, fruits, vegetables, meat, fishes, etc.

2) Preservation of medicines and syrups.

3) Manufacturing of ice, photographic films, rubber products.

4) Processing of petroleum and other chemical products.

5) Liquefaction of gases like N_2, O_2, H_2, etc.

6) Cooling water.

7) Comfort air conditioning of auditoriums, hospitals, residence, offices, factories, hotels, computer rooms etc.

17. The properties of ideal refrigerator :-

1) High latent heat of evaporation and low specific volume.

2) Good thermal conductivity for rapid heat transfer.

3) Non-toxic, non-flammable and non-corrosive.

4) Low specific heat in liquid state and high specific heat in vapour state.

5) Low saturation pressure.

6) High co-efficient of performance.

7) Economical in initial cost and meintenance cost.

18. The advantages of split A.C. over window A.C. :-

1) The compressor is outside of room, therefore no compressor noise in the room.

2) No window opening and fixing needed.

3) The first part can be located in the room with decorative display. The first unit can

be mounted on floor, ceiling and wall or behind a decorative structure.

19. Principle of air conditioning :

→ In air conditioning system, the device or unit provides air conditioning is called air conditioner.

→ This device continuously draws air from an indoors space which is required to cool, it cools in refrigeration system and discharge back into the same indoor space.

→ This continuous cyclic process of drawing, cooling and recirculation of the cooled air maintains indoor space cool at the required lower temperature which is required for comfort cooling or industrial cooling.

* Applications of air conditioning :-

1) For human comfort :

→ To provide cooling or heating and conditioning of air as per comfort of human being. This is known as

comfort air conditioning.

2) For commercial use :

→ To provide cooling or heating and conditioning air as per required in some engineering manufacturing and processing.

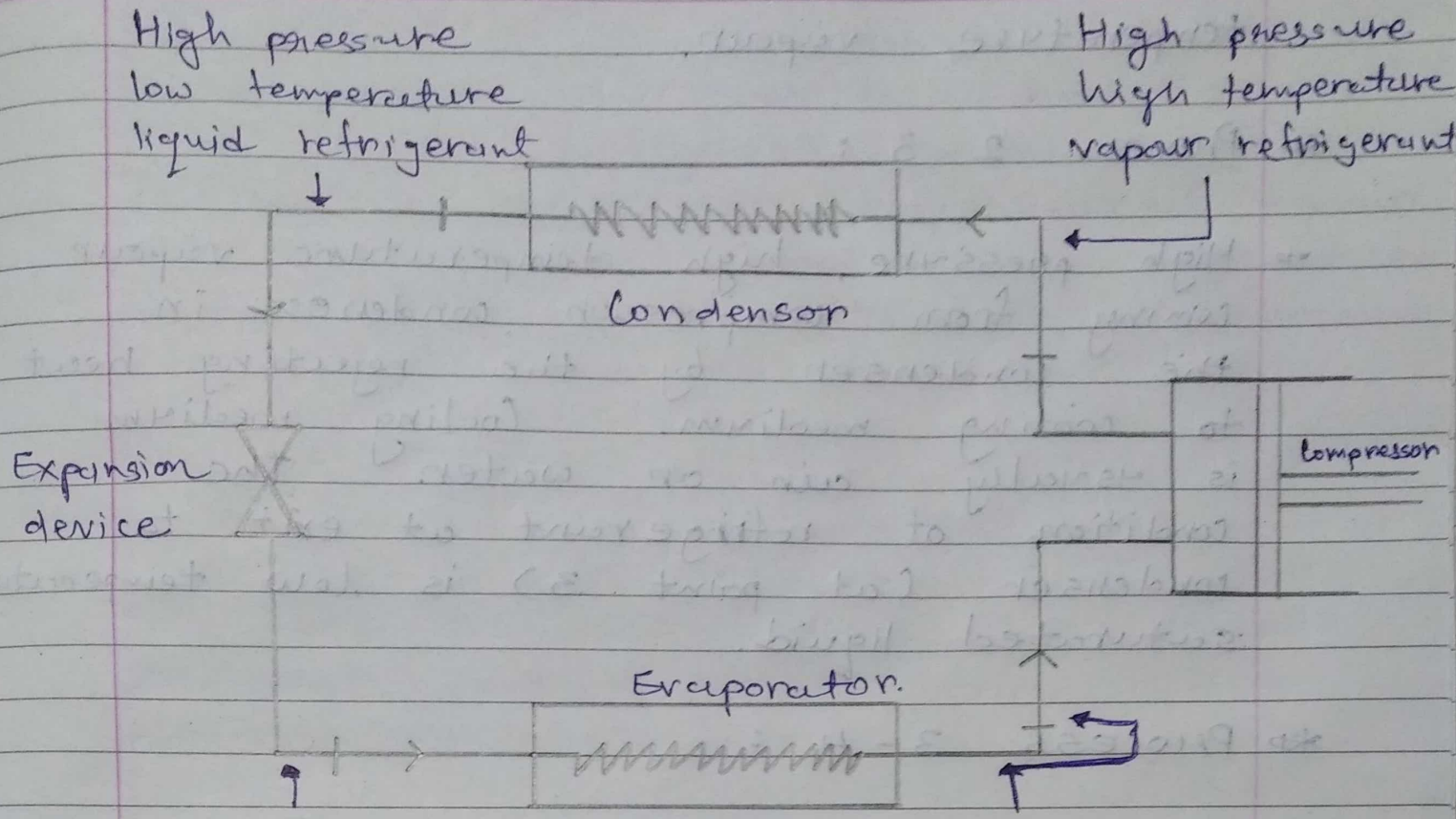
→ This is known as industrial air conditioning.

20. Refrigeration :-

→ Refrigeration is defined as "the method of reducing the temperature of a system below surrounding temperature and maintaining it at the lower temperature by continuously abstracting the heat from it."

* Working of vapour compression refrigeration system :-

→ VCR
1. Evaporator
2. Compressor
3. Condenser
4. Expansion device.



** Process 1 - 2 :-

→ Inlet of compressor (at point 1), low pressure and low temperature vapour enters the compressor. Compressor compresses the vapour at high temperature and pressure. The condition of refrigerant at exit to compressor (at point 2) is high pressure and high

temperature vapour.

** Process 2 - 3 :

→ High pressure, high temperature vapour coming from compressor condeness in the condenser by the rejecting heat to cooling medium. Cooling medium is usually air or water. The condition of refrigerant at exit to condenser (at point 3) is low temperature saturated liquid.

** Process 3 - 4 :

→ The saturated liquid coming from condenser passes through expansion device [throttling valve] where pressure of saturated liquid decreases from condenser pressure to evaporator pressure. The condition of refrigerant after throttling is low temperature and low pressure liquid.

** Process 4 - 1 :

→ Liquid refrigerant coming from expansion device enters into evaporator where it absorbs latent heat of evaporation

from space to be cooled [refrigerant compartment]. Due to absorption of heat liquid refrigerant converted into saturated vapor or superheated vapour at low pressure and low temperature. Again this vapour enters into compressor and the cycle is repeated.

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