Poll no :- 2150.

Modern College of Engineering

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Div - L3

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Assignment - 4.

Aim :- Assignment on domestic appliances — Refrigerators.

1] What are refrigeration, refrigerator, refrigerant and Ton of refrigeration?

Ans.

i) The process of keeping an item below room temperature by storing the item in a system or substance designed to cool or freeze. The most common form of refrigeration is provided by systems (i-e refrigerators) that use a refrigerant chemicals to remove heat from items stored inside the system.

ii) A refrigerators is a machine for keeping things cold. It is sometimes called a fridge or an icebox. People put food and drinks in it, to keep those items cold or good (unspoiled) for a longer time. A refrigerators has a heat pump. The heat gets added to the air outside.

iii) A refrigerant is a substance or mixture, usually a fluid, used in a heat pump and refrigeration cycle. In most cycles it undergoes phase transitions from a liquid to a gas and back again. Many working fluids have been used for such purposes. Fluorocarbons, especially chlorofluorocarbons, became commonplace in the 20th century, but they are being phased out because of their ozone depletion effects.

iv) A ton of refrigeration (TR), also called a refrigeration ton (RT), is a unit of power used in some countries to describe the heat-extraction capacity of refrigeration and air conditioning equipment. It is defined as the rate of heat transfer that results in the freezing of 1 short ton of pure ice at 0°C in 24 hours.

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2] Explain the vapour compression refrigeration cycle.

Ans. i) The vapor-compression uses a circulating liquid refrigerant as the medium which absorbs and removes heat from the space to be cooled and subsequently rejects that heat elsewhere.

ii) All such systems have four components, a compressor, a condenser, a thermal expansion valve, and an evaporator.

iii) Circulating refrigerant enters the compressor in the thermodynamic state known as a saturated vapor and is compressed to a higher pressure, resulting in a higher temperature as well.

iv) The condensed liquid refrigerant, in the thermodynamic state known as a saturated liquid, is next routed through an expansion valve where it undergoes an abrupt reduction in pressure. That pressure reduction results in the adiabatic flash evaporation of a part of the liquid refrigerant

condenser may be water-cooled or air-cooled.

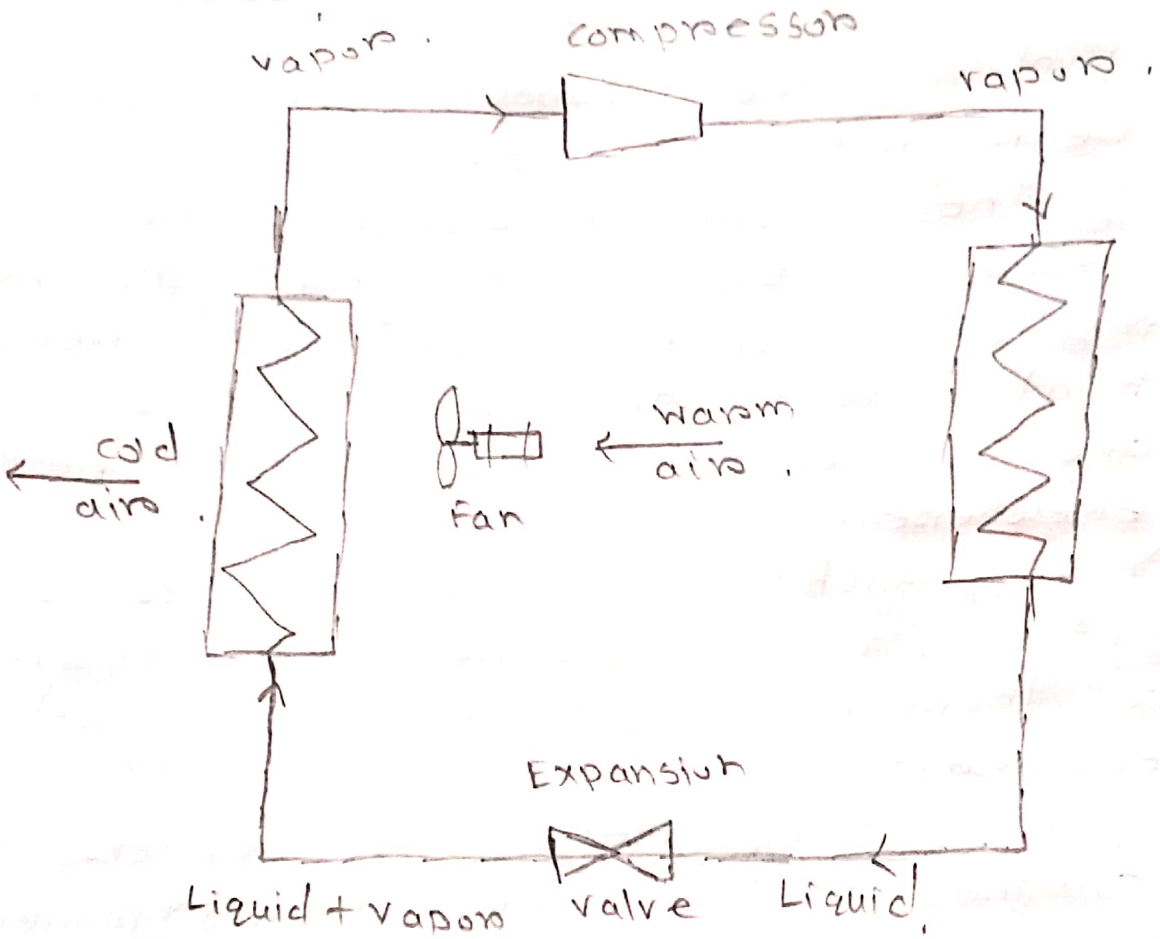

Fig. Typical single stage vapor compression refrigeration.

v) The auto-refrigeration effect of the adiabatic flash evaporation lowers the temperature of the liquid and vapor refrigerant mixture to where it is colder than the temperature of the enclosed space to be refrigerated.

vi) To complete the refrigeration cycle, the refrigerant vapors from the evaporators is again a saturated vapor and is routed back into the compressor.

3] Explain the internal parts of domestic refrigerators. Draw schematic diagram.

Ans. The 6 Main components of a ~~Refrigeration~~ system.

i) Thermostatic Expansion valve (TXV).

- This device helps to separate the high pressure and the low pressure sides of an air conditioning system. Through the system's liquid line, high pressure and liquid refrigerant enters the valve

but with the TVX's presence, the amount of liquid refrigerant entering the evaporator will be abridge.

ii) Evaporator :-

-The sole purpose of the evaporator is to remove the unwanted heat from the product through liq-uid refrigerants. The liquid refrigerant must be at a low-pressure. This low pressure can be determined by two - factors - one is the heat being absorbed from the product to the liquid refriger-ant and the other is the removal of low - pressure vapour by the compressor.

iii) Capacity control system :-

-As its name might suggest, the capacity control system regula-tes the power and energy consumption, although it can also manage dehumidification or decrease compressor cycline. The on/off cycling of the compressor is the simplest form of capacity control.

iv) Condenser :- This device can extract heat from the refrigerant. Fans placed above the condenser unit draw air over the condenser coils. The temperature of condensation should range from around -12°C to -7°C; vapour will be cooled until it becomes a liquid refrigerant again, whereby it will retain some heat.

v) Compressor :- This draws low-temperature and low-pressure vapour from the evaporator through the suction line.

vi) Receiver :-

As a temporary storage and a surge tank for liquid refrigerant, the receiver acts as a vapour seal. With a primary purpose of preserving the vapour moving down the liquid line to the expansion valve, receivers can be made for both horizontal and vertical installation.

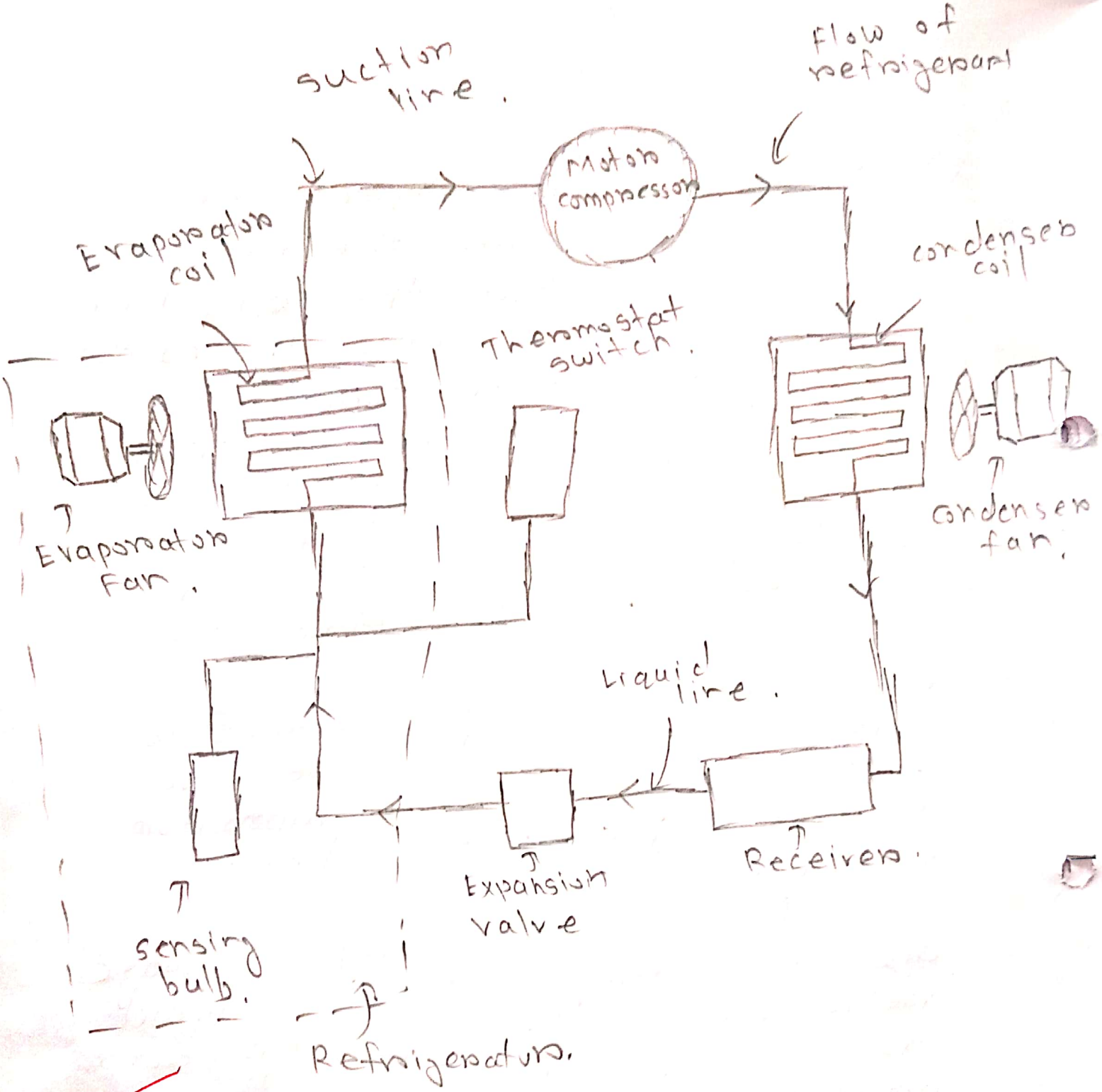

Fig Refrigeration System.

4] Explain the external visible parts of refrigerator. Draw schematic diagram.

Ans.

i) Freezer compartment :- The food items that are to be kept at the freezing temperature are stored in the freezer compartment.

ii) Thermostat control :- The thermostat control comprises of the round knob with the temperature scale that help setting the required temperature inside the refrigerator.

iii) Refrigerator compartment :- The refrigerator compartment is the biggest part of the refrigerator. Here all the food items that are to be maintained at temperature above zero degree celsius but in cooled condition are kept.

iv) Crispers :- The highest temperature in the refrigerator compartment is maintained in the crispers.

v) Refrigerator door compartment :- There are number of smaller subsections in the refrigerator

main door compartment.
vii) switch :- This is the small button that operates the small light inside the refrigerator.

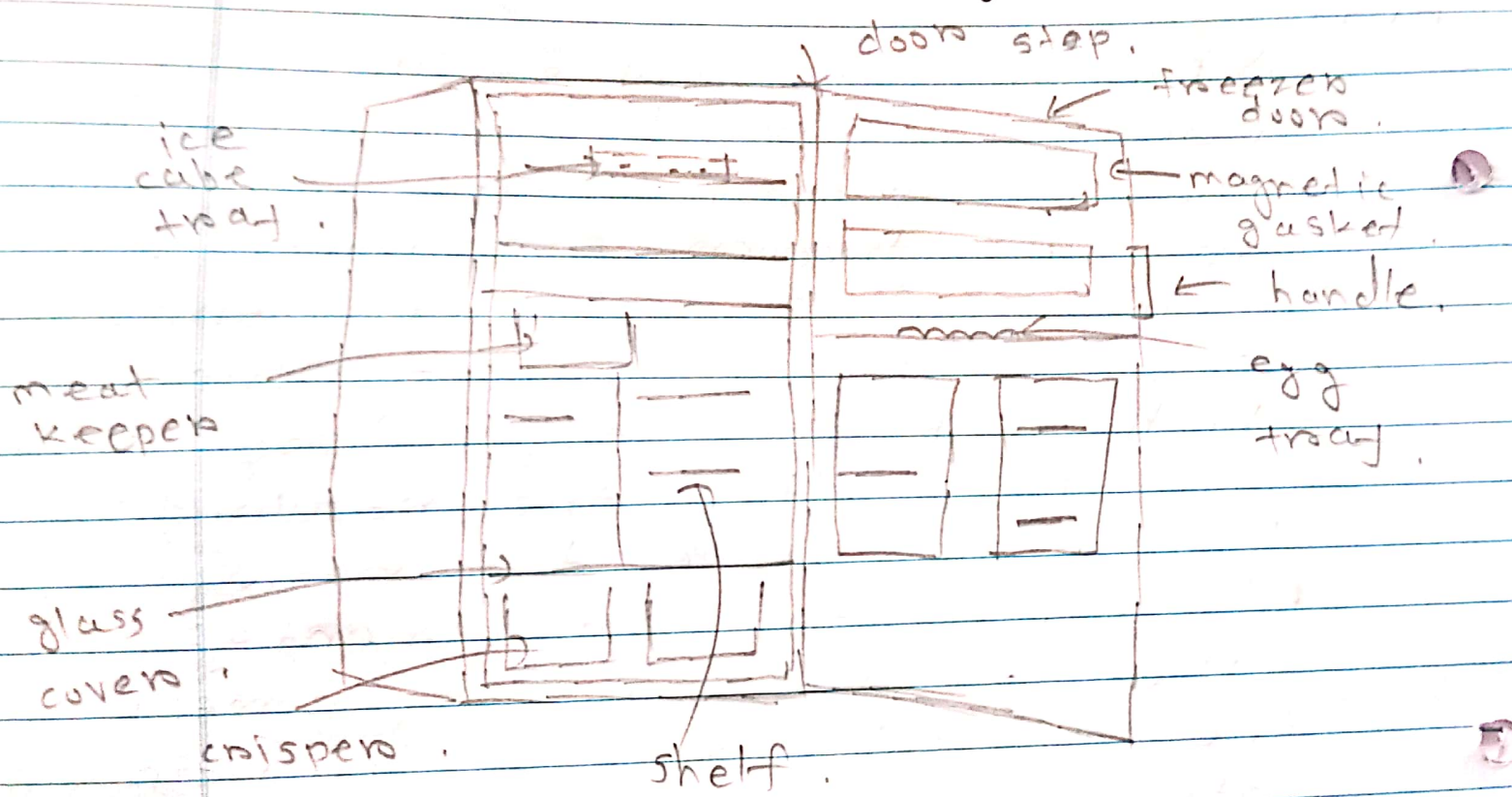

Fig: External visible parts of refrigerator.

5] What are the applications of refrigeration?

Ans.

1) Probably the most widely used applications of refrigeration are for air conditioning of private homes and public buildings.
2) The use of refrigerators in kitchens for storing fruits and vegetables has allowed adding fresh salads to the modern diet year round, and storing fish and meats safely for long periods.
3) In commerce and manufacturing, there are many uses for refrigera-tion. Refrigeration is used to liquefy gases - oxygen, nitrogen, propane and methane.
4) Dairy products are constantly in need of refrigeration, and it was only discovered in the past few decades.

These are some applications of refrigera

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