

Refrigeration and air conditioning charts, design tables and Catalogues are allowed.

Answer all the following Questions

**Question (1):**

(5+5+40=50 Marks)

- Discuss the classification of refrigeration compressors showing the advantages and disadvantages of semi-sealed type compressor.
- With the aid of drawing indicate the construction of automatic expansion valve and discuss how does it work.
- It is required to design a cold store consists of two rooms in a hospital, (A and B), as shown in Fig. (1-a) at Shebin El-Kawm. The store lies in the ground floor, which is (3.6 m) height. Room (A) is used for storing fresh meat while Room (B) is used for storing fresh vegetables. All walls, ceiling and floor are common building and insulated with (10 cm) Expanded Polyurethane–Aluminum Panel. Inside temperature of both rooms is 0 °C. The estimated cooling load for room A is 8.2 kW while that of room B is 8 kW. The flow diagram for the suggested refrigeration system, with R-22 as a refrigerant, is shown in Fig. (1-b).

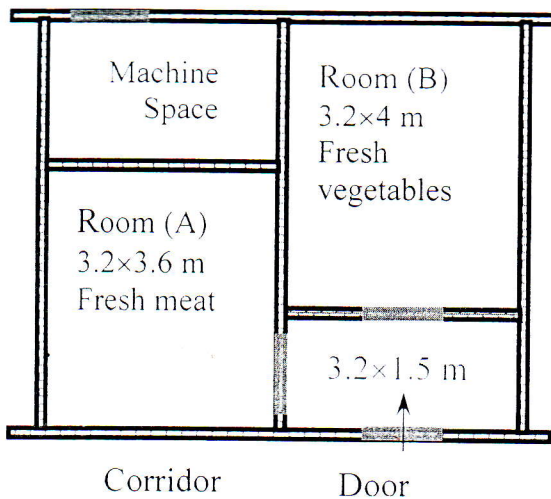


Fig. (1-a)

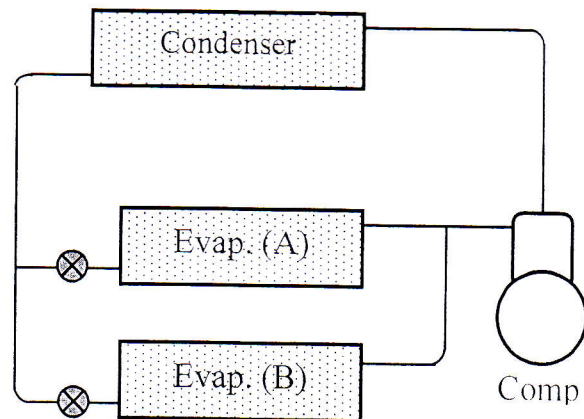


Fig. (1-b)

**It is required the following:**

- Refrigeration capacity for each evaporator.
- Selection of: each evaporator, compressor, condenser and each expansion valve.
- Piping system design.
- Redraw the refrigeration system showing the all suitable control devices those organize the system operation. Describe the system operation when any of the two rooms reaches 0 °C.

\*\*\*\*\*