



Answer all the following questions.

Clear all your answer with drawing.

Question (1)

(32 Marks)

- 1-1 What is function of thermostat? Give some examples of applications of using thermostat with sketches.
- 1-2 What are the importance of automatic control in the field of refrigeration and air conditioning systems?.
- 1-3 Define: Amplifier, transducer, sensor and actuators.
- 1-4. Explain briefly the types for *energy sources* for control systems used in air conditioning systems? Give example for pneumatic controls systems .

Question (2)

(32 Marks)

- 2-1 Mention all the flow rates measurement *sensors* (liquid and gas), select one of them and explain the construction with a sketch, theory of working and its advantages?
- 2-2 What are the types of *valves* used in control of refrigerant fluid flow rates.
- 2-3 What is thermal expansion valve (TEV) used in refrigeration and air conditioning systems (sketch, theory of working, construction and its advantages)?
- 2-4 Sketch and explain the theory of working the drag flowmeter (Rota-meter).

Question (3)

(18 Marks)

- 3-1 Mention the *sensing elements* for temperature measurements for control systems in field of air conditioning systems. And explain one of them with a neat sketch.
- 3-2 What are the types of *electric circuits* used in control systems used in refrigeration and air conditioning systems? And what are the main components of these circuits?
- 3-3 What are the main basic *components of control systems* in field of refrigeration and air conditioning systems? Give an example for closed system.

Question (4)

(18 Marks)

- 4-1 What are the types of *humidity sensors* and explain one of them with a suitable sketch?. What are the materials used in fabricating these sensors?
- 4-2 Give an idea for electronic controllers
- 4-3 What are the types of *controllers*, then *explain* one of them (construction and operation).

with the best wishes

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