



Answer all the following questions.
Clear all your answer with drawing.

Question (1)

(24 Marks)

- 1-1 Explain briefly the types of *energy sources* for control systems?
- 1-2 What are the *main purposes* of automatic control in the field of air conditioning system.
- 1-3 What are the main basic *component of control systems*.
- 1-4 Explain with a diagram the method used for air conditioning (closed loop) control systems.

Question (2)

(22 Marks)

- 2-1 Mention the flow rate *sensors*, explain one of them with a sketch?
- 2-2 What are the types of *valves* used in control of refrigerant flow rates.
- 2-3 Write notes on the construction, application and advantages of Automatic Expansion Valve.
- 2-4 Sketch and explain the theory of working the drag flow meter (Rotameter).

Question (3)

(24 Marks)

- 3-1 Mention the *sensing elements* of temperature for control systems and explain with a neat sketch one of them.
- 3-2 What are the types of *electric circuits* used in control systems, and what are the main component of this circuit?
- 3-3 Define: Amplifier, sensor and actuators.
- 3-4 Give an idea of electronic controllers.

Question (4)

(30 Marks)

- 4-1 Mention the *humidity sensors* and explain one of them with a suitable sketch. (5 Marks)
- 4-2 With a sketch explain the construction and theory of operation of solenoid valve (8 Marks)
- 4-3 What are the type of *controllers*, explain one of them. (7Marks)
- 4-4 Define: transducers, PE (pneumatic-electric) relay, EP (electric-pneumatic) relay and modulating transducers. (10 Marks)