1. What are the four categories of central electric heating? Electric furnace (air), electric boiler, heat pump, and duct heaters.

2. What are the main components of an electric furnace? Cabinet, blower, elements, and control system.

3. Why is an electric furnace more versatile than an oil or gas furnace? (Several reasons) Can be mounted in more locations, no combustion air required, and can be located in a small space.

4. What is the standard rating for each bank in an electric furnace-heating element? 5KW or 4.5KW

5. Why are the elements in electric furnaces designed to heat without glowing red? Longer element life.

6. How are electric heating elements in furnaces protected from over heating? Thermal snap-disc on each element.

7. What are the four functions of a central electric heating control system? Room temperature sensing, load switching, limit protection, control of the distribution means.

8. What type of thermostat is typically used for central electric heating units? Low voltage.

9. At what point in the operation of a furnace should the blower start? At startup or very soon after.

10. How is airflow verified in the control system before the elements are energized in an electric furnace? Sail switch
11. Why is airflow necessary before the elements are energized in an electric furnace?

Elements heat very rapidly and airflow is necessary immediately.

12. Why is it not necessary for the fan to continue after the last element is de-energized? When power is removed from the elements heat stops very soon.

13. What is an electric heat sequencer and what is its purpose? Sequencer will turn the fan and several elements on and off in sequence from one device.

14. How does a thermal-delay relay operate? Bimetal element time delay used for one element and may contain auxiliary contacts to start another relay timing when it closes. (20-75 seconds)

15. What is the sequence of events when a call for heat is initiated in an electric furnace? Low-voltage thermostat closes and starts the timing for the first element and the blower. Blower starts after short delay then contacts in relay one close to energize element one. Auxiliary contacts also close to start timing for relay two. After delay, relay two closes energizing element two and auxiliary contacts close to start timing for relay three. This continues until all elements are energized and the thermostat is satisfied, then the elements will de-energize in sequence and the blower will run stop.

16. What is multi-stage control of an electric furnace? A two step process where the first step (using only part of the system) will be utilized unless the second stage is required.

17. List two methods of control for a two-stage system on an electric furnace? Multistage indoor thermostat (or two separate thermostats) and adding an outdoor
thermostat to the indoor one allowing the second stage of heating only if the outdoor temperature drops below a certain level.

18. What are the two types of limit protection for an electric furnace? Overcurrent and high temperature.

19. Why is a plenum high-limit control not used for electric furnaces? To allow more flexibility in mounting positions.

20. How is an electric boiler different from an electric hot air furnace? Water for the medium instead of air, piping instead of ducts, and a circulator instead of a blower.

21. How many aquastats are on a typical electric boiler? 2

22. How is pressure maintained in an electric boiler system? Automatic fill valve.


24. What is the advantage of open-coil elements in duct heaters? Less resistance to air flow and less area to collect dust and dirt.

25. Where are tubular or finned elements used in duct heaters? Human exposure or environmental issues are a factor.

26. What are the two types of construction for duct heaters? Flanged-type and slip-in.

27. What are the four applications of duct heaters? Primary heat, reheat, preheat, and supplemental heat.

28. What is the term used to describe the heating of supply air for an air handling system with a duct heater? Preheat
29. What term is used for a duct heater installed in a heat pump system for peak times? **Supplemental heat.**

30. Why is minimum airflow necessary when duct heaters are installed in air control systems? **Achieve good heat transfer, prevent overheating, and maintain life expectancy of the unit.**

31. How much straight duct should be left before a transition or bend when installing a duct heater? **1.2m**

32. How much clearance is required around an electric furnace less than 50 kW? **None.**

33. Which type of duct heater can be mounted in any position? **Tubular.**

34. Which type of duct heater can only be mounted in the horizontal position? **Open element.**

35. What is the main problem with on/off, multi-stage control? **Large temperature swings.**

36. What is multi-stage, step control? **Using a modulating thermostat and multi-stage device.**

37. What is the advantage of using more, smaller units for a heating element? **Cost of control devices may be less.**

38. What is the benefit of SCR control of an electric heating element? **Precise temperature control**

39. Describe combination control of an electric heating element in a central electric heating system? **Combination of step-controller and SCR. Step controller**
energizes the approximate number of steps and the SCR provides final control between stages.