1 Exam Prep

Solar Water and Pool Heating Manual (UCF)

Questions and Answers

(Plumbing Contractor)

1. For year-round use, a collector tilt of ____ degrees works best for a project located in Tampa, Florida.

a) 28 degrees

b) 31 degrees

c) 38 degrees

d) 43 degrees

2. When the collector sensor senses temperatures _____ degrees F. hotter than the tank sensor, the pump is turned on. Assume a differential controller was installed.

a) 3 degrees F.

b) 4 degrees F.

c) 5 to 20 degrees F.

d) 30 to 35 degrees F.

3. A mounted collector, exposed to wind forces, and its mounting structure need to be able to withstand wind loads up to _____ mph.

a) 120

b) 130

c) 140

d) 146

4. When installing collector to storage piping, the minimum thickness of the rubber type insulation necessary on the piping is _____ .

a) 1/2"

b) 3/4"

c) 1"

d) 1 1/2"

5.A solar collector oriented 30 degrees east or west of due south will require _____times the collector area of a system oriented due south.

a) 1.1

b) 1.3

c) 1.5

d) 1.7

6. A multiple collector system has 3 collectors piped in parallel. The collector to storage piping for the feed and return lines should be _____ in diameter.

a) 1/2" copper

b) 1/2" or 3/4" copper

c) 3/4" or larger

d) 1" minimum

7. The optimum collector tilt for year-round use for domestic solar water heating in Jacksonville, Florida would be _____.

a) 25

b) 30

c) 38

d) 86

8. What is the angle of incidence when the sun is directly overhead?

a) 0 degrees

b) 90 degrees

c) 180 degrees

d) 270 degrees

9. The solar return on a standard electric water heater should have a dip tube to return heated water approximately _____below the upper element's thermostat.

a) 2 inches

b) 3 inches

c) 4 inches

d) 6 inches

10. What is the turnover time for a pool heating system using a gas or oil heater with100 feet of 2 inch diameter pipe and a 1 hp pump?

a) 9 hours

b) 8 hours

c) 7.2hours

d) 8.6 hours

11. How many heat traps should be installed on the storage tank piping?

a) 1

b) 2

c) 3

d) 4

12. Which collectors accept both direct and diffused radiation?

a) Focusing Type

b) Storage Tank

c) Evacuated Tube

d) Flat Plate

13. What is the maximum btu per square foot per hour of diffused and direct radiation that reaches the earth in Florida?

a) 295

b) 305

c) 350

d) 428

14. What percentage of solar energy is lost in the upper atmosphere?

a) 10%

b) 20%

c) 30%

d) 50%

15. On a daily basis, the "solar window" offers ___ hours of "usable" solar energy.

a) 3

b) 6

c) 9

d) 12

16. Corrosion caused by the contact between dissimilar metals is called _____?

a) Rust

b) Galvanic Corrosion

c) Cathodic Protection

d) Anodizing

17. A solar water heating system would have its air vent located _____?

a) at the midpoint of the storage tank

b) vertical, in the uppermost part

c) immediately above the drain valve

d) air vents are not part of the system

18. Where is the storage tank located on a thermo siphon system?

a) above the collector

b) below the collector

c) beside the collector

d) within the collector

19. In an active direct solar water heating system, the pump must have a _____housing and impeller to prevent corrosion from water chemistry.

a) Bronze

b) Aluminum

c) Steel

d) Cast-Iron

20. What is the most commonly used heat-transfer fluid for indirect solar water heating systems?

a) Water

b) Effluent

c) Silicone

d) Glycols

21. The type of isolation valve that is used to manually isolate the various subsystems is the _____ , which provides a complete flow barrier.

a) Gall

b) Globe

c) Ball

d) Drain

22. In order to prevent thermosiphoning action in a solar water heating system, many types of check valves are available. Which of the following is not a type of check valve?

a) Vertical Check Valve

b) Tempering Valve

c) Horizontal Swing Check Valve

d) Motorized Check Valve

23. Where is the flow meter in a solar water heating system located?

a) In the collector discharge piping

b) In the collector feed line, below the pump

c) In the collector feed line, above the pump

d) At the highest point in the system

24. Ideally, a solar collector should face due south, but facing a collector 40 degrees either east or west of due south will reduce the performance by about _____ percent.

a) 13%

b) 25%

c) 40%

d) 50%

25. In a gravity type system it is recommended that piping slope at least _____ per foot to allow for gravity draining.

a) 1/8"

b) 1/4"

c) 1/2"

d) 1"

26. Most active direct solar water heating systems supplied by pressurized water will have valves on the roof to aid in venting and filling. Those air vents should be located _____.

a) Below the inlet to the storage tank

b) Immediately above the drain valve

c) Between the temperature and pressure valves

d) Anywhere air could be trapped in pipes

27. Where is the temperature and pressure relief valve installed for a solar water heating system?

a) at the highest point in the system

b) at the top of the solar storage tank

c) in the collector piping

d) on the collector loop

28. What is the recommended depth of the pitch pan used where the collector leg attaches to a flat roof?

a) 4 inches

b) 3 inches

c) 2 inches

d) 1-1/2 inches

29. Component of the solar water heating system should be protected from freezing. How many methods of freeze protection are there?

a) 6

b) 5

c) 4

d) 2

30. The friction loss or pressure drop experienced through a 1" - 90 degree long radius copper elbow is equivalent to that of _____ feet of straight 1" pipe.

a) 1

b) 1.7

c) 3

d) 2.3

31. Sand, gravel or anthracite filters are sometimes operated at a flow rate of 20 GPM per square foot. Some jurisdictions limit the flow rate through these filters to _____ .

a) 8 GPM per square foot

b) 5 GPM per square foot

c) 3 GPM per square foot

d) 2 GPM per square foot

32. When sizing connecting pipes, excessive flow rates that cause erosion of the interior surfaces should be avoided. Some code jurisdictions limit the rate of water flow through copper pipes to _____.

a) 8 FPS

b) 5 FPS

c) 3 FPS

d) 2 FPS

33. A swimming pool circulation pump is to maintain a flow rate of 65 GPM against a total head of 60 feet. The pump's horsepower is _____ .

a) 3/4 HP

b) 1 HP

c) 1 1/2HP

d) 2 HP

34. Estimate the volume of water in a pool which measures sixty feet in length, thirty-two feet in width and has an average depth of five feet. This pool would contain _____ liters when filled flush to the top.

a) 9,600

b) 36,336

c) 71,808

d) 271,793

35. The friction loss experienced when water flows through a 2" diameter swing check valve is equal to that of feet of2" diameter pipe.

a) 1.15'

b) 3.0'

c) 11'

d) 13'

36. Temperature differential is sometimes referred to as ____ _

a) TD

b) Temp D

c) Delta T

d) DT

37. Regarding climatic zones in Florida, Gainesville is located in _____ .

a) North Central Zone

b) Northern Zone

c) Central Zone

d) Mid-Central Zone

38. How many gallons of water would be contained in a 2 foot diameter storage tank which is 5 feet in height? Assume the tank is filled.

a) 470

b) 117

c) 62.8

d) 100

39. Estimate the volume of water contained within a cylinder measuring 4 feet in diameter and 16 feet in height. The cylinder has a pipe passing through it vertically which measures 6" o.d. No other obstructions are within the cylinder. The pipe, not filled, will displace water.

a) 1,480 Gallons

b) 1,503 Gallons

c) 2,630 Gallons

d) 6,012 Gallons

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Answers

1	Answer: A	Solution: Page 1-11, 25 degrees for S. Fl. and 30 degrees for N. Fl.
2	Answer: C	Solution: Page 3-25
3	Answer: D	Solution: Page 3-2
4	Answer: A	Solution: Page 3-21 #9
5	Answer: A	Solution: Page 1-10, Figure 7, 30 degrees, move up to line, about 1.1
6	Answer: C	Solution: Page 3-20
7	Answer: B	Solution: Page 1-11, North Florida
8	Answer: A	Solution: Page 1-5, Figure 3, 0 degrees
9	Answer: D	Solution: Page 3-23 #7

10 Answer: C Solution: Page 5-21 Table 7.1, gas or oil, 100' - 2", 1 hp, 7.2

11 Answer: B Solution: Page 3-23, #4 (1-cold water inlet) (1-hot water supply)

12 Answer: D Solution: Page 1-4 and Section 2, System Components, Page 2-1

13 Answer: A Solution: Page 1-4 Figure 2

14 Answer: C Solution: Page 1-4 Figure 2

15 Answer: B Solution: Page 1-4

16 Answer: B Solution: System Components, Page 2-26

17 Answer: B Solution: System Components, Page 2-37, Figure 24

18 Answer: A Solution: System Types, Page 2-8

19 Answer: A Solution: System Components, Page 2-25

20 Answer: D Solution: System Components, Page 2-35

21 Answer: C Solution: System Components, Pages 2-40 and 2-41

22 Answer: B Solution: System Components, Pages 2-42 and 2-43

23 Answer: C Solution: System Components, Page 2-46

24 Answer: A Solution: Page 1-10, Figure 7, 40 degrees, move up to line, 1.13

25 Answer: B Solution: Page 3-18, Figure 24

26 Answer: D Solution: System Components, Page 2-37

27 Answer: B Solution: System Components, Page 2-37 and 2-38

28 Answer: D Solution: Page 3-11

29 Answer: B Solution: System Types, Page 2-11

30 Answer: B Solution: Page 5-22, 1", 90 degree elbow, copper, intersect lines

31 Answer: C Solution: Page 5-14

32 Answer: B Solution: Page 5-15

33 Answer: C Solution: Page 5-15, Intersect 65 GPM with 60' head

34 Answer: D Solution: Math, 60' x 32' x 5' x 7.48 x 3.785 = 271,793 Liters Walker's Mensuration 24.2

35 Answer: D Solution: Page 5-22, Table 7.2, Swing Check Valve, under 2"

36 Answer: C Solution: Page 1-6

37 Answer: A Solution: Page 5c6

38 Answer: B Solution: Math 3.14 x 1’ x 1’ x 5’ x 7.48 = 117.4 Walker's Mensuration

39 Answer: A Solution: Cylinder 3.14 x 2' x 2' x 16' x 7.48 = 1,503.18 gallons

Void 3.14 x .25' x .25' x 16' x 7.48 = < 23.48 > gallons