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Question: 1

Which of the following sources of waste water that may be reclaimed is not considered to be greater?

A. Rain water
B. Water from showers
C. Water from sinks
D. Water from washing machines

Answer: A

EXPLANATION:
Greater comes from sinks, showers, washing machines, and possibly dishwashers (dark greywater). Rain water is most often collected and used for non-potable purposes, but it can also replace potable water after suitable treatment.

Question: 2

A chiller retrofit project will cost $200,000 to implement and have a useful life of twenty years. If the company pays $0.08/kWh for electricity and uses a discount rate of 12%, how many Kilowatt- hours must the project save each year to pay for itself?

A. 298,200
B. 312,900
C. 334,7 00
D. 352,300

Answer: C

EXPLANATION:
The present worth of the investment (P), interest rate (i), and period of time (n) are Known. The annual value (A) is what needs to be found, so the interest factor (A/P) should be found in the 12% interest table on row n = 20, which is 0.13388. $200,000 x0.13388 = $26,7 76 per Year.
Dividing by the cost of energy gives the number of kilowatt-hours that need to be saved:
$26,77 G/ $$^{o}.^{08}$ = 334,700 kWh.
KWh

Question: 3

Which of the following is not typically a goal of a facility energy audit?

A. Identify the sources and costs of energy used
B. Understand how energy is used and where any waste occurs
C. Determine which energy end-use services are not required
D. Calculate the potential energy and cost savings from implementing suitable energy conservation measures identified during a facility walk-through

Answer: C

EXPLANATION:
A goal of an energy audit is to identify wasteful energy use, but it is not generally Expected that there are end-use services which are not required at all.

Question: 4

An office conference room has six fixtures each with four 18 W T8 lamps. The lamps are Connected to the main office light switch so they are on for 10 hours every day, however the Conference room is only used an average of 4 hours each day. Calculate the energy savings possible by installing an occupancy sensor that will switch off the lights in the conference room when it is unoccupied.

A. 2.6 kWli/day
B. 1.7 kWli/day
C. 4.3 kWh/day
D. 3.1 kWh/day

Answer: A

EXPLANATION:
The total power of the conference room lighting is 6 x 0.018 kW x 4 = 0.432 kW. They Currently use 0.432 kW x 10 hours = 4.32 kWh/day. An occupancy sensor will reduce the energy Consumption to0.432 x 4 hours = 1.728 kWli/day. Therefore, the energy savings are 2.6 KWli/day.

Question: 5

Which piece of equipment listed below would not be found in a hydraulic heating system?

A. Fire tube boiler

B. Radiator
C. Furnace
D. Expansion tank

Answer: C

EXPLANATION:
A furnace is used in forced air heating systems. A hydraulic heating system uses water as the heat transfer medium. A boiler, water source heat pump, or other technology is used to heat water where it is distributed to a terminal unit such as a radiator or fan coil unit. An expansion tank is required to control the pressure in a hydric system as the water expands and contracts as it changes temperature.

Question: 6

Which of the following descriptions of a hydraulic system most closely matches the Characteristics of a two-pipe distribution system?

A. Terminal units are connected in parallel providing relatively high therm al control and system efficiency
B. Terminal units are connected in series producing relatively poor thermal control, but less piping is needed
C. Simultaneous heating and cooling is possible, but the hot and cold return water is mixed so the system is very inefficient
D. Separate heating and cooling provides good thermal control at high efficiency, but at relatively high cost

Answer: A

EXPLANATION:
A two-pipe water distribution system has a separate supply and return pipe and each terminal unit is connected in parallel. The system can only provide heating or cooling at any one time, but each zone can control the amount of heating or cooling needed so thermal control is high. Because the supply and return pipes are separate the efficiency is also relatively high.

Question: 7

Which of the following is a typical Energy Use Index?

A. MMBtu/kWh
B. $/Mcf
C. kWli/ft2
D. therm

Answer: C

EXPLANATION:
kWli/ft' is an Energy Use Index (EUI) that is typically used in energy benchmarking to compare the energy performance of similar building types having different size.

Question: 8

Calculate the annual heating cost savings per square foot for a facility that adds insulation which drops the overall U-value of the building from 0.25 to 0.18 if the heating system is a natural gas boiler with an efficiency of 85%, the cost of gas is $8.50/Mcf, and there are 5,000 heating degree days each year. (Assume 1 Mcf = 1,037,000 Btu)

A. $0.048/ft2
B. $0.053/ft2
C. $0.0G9/ft2
D. $0.081/ft2

Answer: D

EXPLANATION:
The annual heating system energy is calculated by:
q = U x A x 24 x ADD Therefore, the annual energy savings per square foot are:
= (0.25 — 0.18) x 24 x 5,000 = 8,400 Btu
The cost savings are:
A t2
$ 8,400 Btu 1 Mcf
Sa viii gs gt2 0. 5 ft* X 1,037,000 Btu x %850 Mcf 0'8

Question: 9

Which of the following lists of energy audit tasks is presented in the order that they would usually be performed?

A. Analyze energy bills to understand historical energy consumption; walk-through the building to understand the building systems and operation; determine the potential energy savings and costs of energy conservation measures; prepare an audit report
B. Carry out a computer simulation of the building's energy demands; walk-through the building; recommend low- and no cost energy efficiency measures; analyze energy bills to determine energy costs and potential savings
C. Survey the building to understand the systems and operation; analyze energy bills to understand historical energy consumption; carry out a computer simulation of the building's energy demands; install metering and measurement equipment in the building

D. Install metering and measurement equipment in the building; recommend low- and no-cost energy efficiency measures; benchmark the building energy demands; prepare an audit report

Answer: A

EXPLANATION:
All audits should begin with an analysis of historical performance from energy bills or other energy data that shows how energy is used over time. Benchmarking performance to other similar buildings would also be carried out as an initial step. Before any building simulation or Installation of measurement equipment was done, a walk-through or survey of the building is Necessary tounderstand the systems installed and how the building is operated. Recommendations of low- or no-cost measures could then be made, or more detailed calculations of the potential savings and costs of energy efficiency measures if a more detailed audit based on field Measurements was performed. An energy audit report would most likely be prepared to present the findings to the owner before deciding on measures to investigate in more detail. Computer Simulations may be performed to assess measures that are deemed worth of pursuing, or additional Instrumentationinstalled to gather more data.

Question: 10

A chilled water reset control strategy is implemented when:

A. The supply air temperature set point is increased.
B. The chilled water supply temperature is increased.
C. The chilled water return temperature is decreased.
D. The return air temperature set point is increased.

Answer: B

EXPLANATION:
As the outside air temperature gets colder it is possible to raise the chilled water Supplytemperature and still maintain the same supply air temperature. Other indications that the chilled water supply temperature may be increased are a smaller chilled water supply and Return differential, and valve positions that are not fully open.

Question: 11

A natural gas fired boiler operates with a combustion air inlet temperature of 80 °F and the Flue gas is at 730 °F with 3% flue gas oxygen. It is proposed that an economizer be installed to Reduce the flue gas temperature to 630 °F. The annual gas consumption of the boiler is 7,000 Mcf and gas costs $8.00/Mcf. What are the expected fuel cost savings by installing the economizer?

A. $1,825/year
B. S1,650/year

C. $1,40 0/year
D. $2,030/year

Answer: C

EXPLANATION:
The stack temperature rise is 730 °F — 80 °F = G50 °F. A combustion efficiency chart for Natural gas shows that at 3% flue gas oxygen the efficiency is 78%. When the flue gas temperature is decreased to G30 °F, the stack temperature rise is reduced to 550 °F and the efficiency is 80%. The percent in fuel savings is calculated by:
feel Sa viii New Efficieiicy — OId Efficieiicy 80 — 78 = 2.5%
New Efficieiicy 80
Therefore, the savings are 2.5% x 7,000 Mcf/year = 175 Mcf/year and 175 Mcf/year x $8.00 = $1,400/year in fuel cost savings.

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