Quiz 1

Name: _____

1) The ratio of luminous output of a lamp to the power input of the lamp is _____
   a. Illluminace
   b. Lux
   c. Color rendering index (CRI)
   d. Efficacy

2) The color rendering index (CRI) is measured in the scale of _____
   a. 1-100
   b. 1-100%
   c. 100-1000
   d. None of the above

3) LPD (Lighting power density) is defined as lighting power divided by _____
   a. The number of fixtures
   b. The area of a room
   c. The number of luminaires
   d. None of the above

4) Which of the following lighting source has the lower lifetime?
   a. LED
   b. Mercury vapor
   c. Incandescent
   d. Halogen

5) The average rated life of a 4' T8 fluorescent lamp is _____
   a. 1,000 hours
   b. 5,000 hours
   c. 7,000 hours
   d. >20,000 hours

6) Color Temperature is_____
   a. A number indicating the degree of "yellowness" or "blueness" of a white light source, measured in kelvins.
   b. An international system used to rate a lamp's ability to render object colors.
   c. A measure of the luminous flux or quantity of light emitted by a source.
   d. None of above

7) Average Rated Lamp life is_____
   a. When the lamp will fail
   b. When you should relamp
   c. When lamp lumens depreciate
   d. When 50% of lamps will have failed

8) The color rendering index of halogen lamps compared to low pressure sodium vapor lamps is _____
   a. Slightly lower
   b. Significantly lower
   c. Slightly higher
   d. Significantly higher

9) The term “luminaire” refers to a _____
   a. Lighting unit exclusively for roadway illumination
   b. Lighting unit exclusively for interior illumination.
   c. Complete lighting unit without lamps and ballasts.
   d. Complete lighting unit including lamps and ballasts.

10) To saving more energy, the following lamps should be considered to be replaced _____
   a. Incandescent
   b. Halogen
   c. Mercury vapor
   d. All of the above

Quiz 2

Name: _____

1) As long as installing lighting control equipment, it will automatically save energy.
   a. True
   b. False

2) Which of following is NOT a type of Occupancy Sensors?
   a. Passive infrared
   b. Ultrasonic
   c. Dual tech
   d. Photocell

3) For commercial building outside parking lot lighting, which control strategy is a better candidate?
   a. Switch on/off
   b. Timer
   c. Occupancy sensor
   d. No control necessary

4) The following lighting control techniques could save both power and time, EXCEPT _____
   a. BMS
   b. Occupancy sensor
   c. Daylighting control

d. Combination of control techniques

5) De-lamping could save expense in which way(s)?
   a. Reducing energy (kWh) consumption
   b. Reducing demand (kW)
   c. Reducing maintenance cost
   d. All of above

6) Which one is a good candidate for Scotopic lighting strategy?
   a. HPS
   b. LPS
   c. Induction
   d. Incandescent

7) Daylighting control often combines with dimming control.
   a. True
   b. False

8) Passive infrared (PIR) sensors utilize _____
   a. A line of sight beam that reacts to heated motion across a field of view
   b. A reflective wave form that reacts to disturbances in return wave form
   c. The ambient light that triggers the control
   d. None of the above

9) If designing lighting control for an executive office, you will choose _____
   a. Switch on/off control
   b. Occupancy sensor control
   c. Daylighting control
   d. Need more information to decide.

10) An office has 3 lighting fixtures (66W each). After installing occupancy sensor, the annual total operation time reduces to 1020 hours from 2550 hours. If the average electricity rate is $0.12/kWh, calculate the annual savings by installing occupancy sensor.
   a. $100
   b. $36
   c. $24
   d. $60

Final exam

Name:_____

Problem 1-30: 2 points each.

1) What code lists the minimum building efficiencies for California?

a. Title 20
b. Title 24
c. LEED
d. CBC

2) Which of the following lighting source has the lower lifetime?
   a. LED
   b. Mercury vapor
   c. Incandescent
   d. Halogen

3) Which of the following lamp has the highest efficacy?
   a. Incandescent
   b. Fluorescent
   c. Metal Halide
   d. Low Pressure Sodium

4) Flicker checker is used to identify the types of _____
   a. Ballast
   b. Occupancy sensor
   c. Lamps
   d. None of the above

5) Passive infrared (PIR) sensors utilize _____
   a. A line of sight beam that reacts to heated motion across a field of view
   b. A reflective wave form that reacts to disturbances in return wave form
   c. The ambient light that triggers the control
   d. None of the above

6) An office has 3 lighting fixtures (68W each). After installing occupancy sensor, the annual total operation time reduces to 1020 hours from 2550 hours. If the average electricity rate is $0.13/kWh, calculate the annual savings by installing occupancy sensor.
   a. $100
   b. $36
   c. $41
   d. $60

7) The term “luminaire” refers to a _____
   a. Lighting unit exclusively for roadway illumination
   b. Lighting unit exclusively for interior illumination.
   c. Complete lighting unit including lamps and ballasts.
   d. Complete lighting unit without lamps and ballasts.

8) Ballast Factor (BF) is _____
   a. This is the percentage of a lamp’s rate lumen output that can be expected when operated on a specific, commercially available ballast.

b. The value is used to evaluate various lighting systems based on light output and power input.
c. A measure of the effectiveness with which an electrical device converts volt-amperes to watts.
d. Measure of the ballast life.

9) 1 footcandle = _____ lux
   a. 1
   b. 10
   c. 0.1
   d. None of the above

10) Illuminance is _____
   a. The density of light falling on a surface
   b. Measured in footcandles
   c. Also measured in lux
   d. All of the above

11) Occupancy sensors are preferred to be installed in _____
   a. Executive offices
   b. Public restrooms
   c. College classrooms
   d. All of the above

12) The principal of designing skylight is the bigger the more saving.
   a. True
   b. False

13) Which of the following buildings may need skylights?
   a. Schools
   b. Grocery stores
   c. Warehouses
   d. All of the above

14) Which of following is NOT a type of Occupancy Sensors?
   a. Photosensor
   b. Ultrasonic
   c. Dual tech
   d. Passive infrared

15) For commercial building employee lounge lighting, which control strategy is a better candidate?
   a. Switch on/off
   b. Timer
   c. Occupancy sensor
   d. Photosensor

16) The average rated life of a LED lamp is _____
    a. 1,000 hours
    b. 5,000 hours
    c. 10,000 hours
    d. >50,000 hours

17) If designing lighting control for a college classroom, you will choose _____
    a. Switch on/off control
    b. Occupancy sensor control
    c. Daylighting control
    d. Need more information to decide.

18) When designing lighting for an office building, how do you decide how much lighting output is enough to conduct the work?
    a. Referring to Title 24
    b. Referring to ADA
    c. Referring to UL
    d. Referring to IES Lighting Handbook

19) Choose the correct statement:_____
    a. Title 24 is a national standard.
    b. Title 24 is good enough that amendment is not necessary.
    c. Title 24 regulates the minimum building energy efficiency in California.
    d. Title 24 supplies the guideline to maximum energy savings.

20) Which of the following about LED is NOT true?
    a. LED is dimmable.
    b. LED has a long life time.
    c. LED only has “cool” color.
    d. LED can be used in a cold environment.

21) Which of the following is a possible lighting EEM for an office building?
    a. De-lamping
    b. Installing occupancy sensors
    c. Daylighting control
    d. All of the above

22) Which of the following lamps is NOT one type of HID?
    a. Halogen
    b. Metal Halide
    c. Mercury Vapor
    d. High Pressure Sodium

23) F32T8/835 means_____

24) To saving more energy, the following lamps should be considered to be replaced except _____
    a. Incandescent
    b. Halogen
    c. Mercury vapor
    d. All of the above

25) Using electronic ballast consumes less energy than using magnetic ballast.
    a. True
    b. False

26) The following type of lamps are point lighting sources EXCEPT_____
    a. Incandescent
    b. Halogen
    c. CFL
    d. Metal Halide

27) Lighting control strategies involve_____
    a. Reduction of the rate of consumption.
    b. Reduction of the duration of consumption.
    c. Reduction of both the rate and duration of consumption.
    d. All of the above.

28) If one EEM reduces both power and operating time, the energy saved will be calculated by:
    a. Δ Energy = Δ Power X Time = ($Power_1$– $Power_2$)X $Time_2$
    b. Δ Energy = Power X ΔTime = Power X ($Time_1$ – $Time_2$)
    c. Δ Energy = $Power_1$ X $Time_1$ – $Power_2$ X $Time_2$
    d. None of the above.

29) When designing skylights, one needs to consider the following:
    a. Visual and thermal comfort.
    b. Heat loss and heat gain.
    c. Structural and safety concerns.
    d. All of the above.

30) Which one is a good candidate for Scotopic lighting strategy?
    a. HPS
    b. LPS
    c. Induction
    d. Incandescent

31) A 40 ft X 50 ft office has 20 lighting fixtures, each with 87 input watts. Calculate LPD in this office. (5 points)

32) 6 high efficiency CFL fixtures (13 watts each) are used to replace 6 incandescent lamps (60 watts each) at a dormitory hallway. They are on 24 hours/day. If the cost of electricity is $0.15/kWh, what is the annual savings in electricity cost? (Ignore the initial cost of the light and its installation.) (5 points)

33) A warehouse has 56 fixtures of 48", four (4) T8 lamps with 2 electronic ballast in series. The lighting level is 60 fcd. Delamping in half will still provide acceptable light, according to IES illumination level standard, assuming the lighting pattern is distributed well through out the area.

The fixtures have 4 units of 32W T8 and 2 units of 10W electric ballasts. Working time is 5600 hours a year. It takes 15 minutes to delamp a fixture, and the labor cost is $32/hour. If the average Energy rate is $0.13/kWh, and Demand rate is $10/kW, calculate: (15 points)

1. Total annual energy savings
2. Simple payback period

34) An air compressor room is lit by 9 F32-T8 2-lamp fixtures. According to maintenance, these lights are left on during plant operating hours even though the area is rarely occupied.

According to product description, their F32T8 2-lamp fixture draws about 68 Watts. Maintenance estimates that the lights are currently on for 24 hours per day, 6 days per week and 51 weeks per year, but really only should be on for about 4 hours per day. (15 points)

1. Calculate total annual energy savings by installing an occupancy sensor wall switch at both entrances to the room.
2. If an infrared occupancy sensor wall switch costs about $90, and it takes 2 hours to install too sensors at a labor rate of $38 per hour. Calculate the simple payback period.

Answers:

Q1: d a b c d a d d d d

Q2: b d b b d c a a d b

Final: b c d a a b c a b d

d b d a c d d d c c

d a d d a c d c d c

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