Safety and Risk Analytics

Assignment 5

1. Safety performance indicators assist in measuring (check all that apply)
    a. System deterioration
    b. System improvement
    c. Weakness of risk control systems
    d. Effectiveness of risk control systems

Answer: Options a,b,c,d

2. Lagging indicators are also called
    a. Process indicators
    b. Input indicators
    c. Outcome indicators
    d. All of the above

Answer: Option c

3. What is the first step of the process of establishing leading and lagging indicators?
    a. Establish the organizational arrangements to review the indicators
    b. Decide on the scope of the measurement system
    c. Identify the risk control systems in place
    d. Review the performance of the process management system

Answer: Option a

4. Which one of the following statements is false regarding variability due to common causes?
    a. This variability is not inherent in the system
    b. This variability cannot be totally eliminated
    c. When the variation is random, we have a stable system of common causes
    d. A system operating under a table system of common causes is said to be under statistical control

Answer: Option a

5. The mean of an exponential distribution is 10. What is the value of variance?
    a. 10
    b. 100
    c. 0.1
    d. 0.01

Answer: Option b

Solution: Mean of exponential distribution is $\frac{1}{\lambda}$ = 10 so λ = 0.1. Variance = $\frac{1}{\lambda^2}$ = 100.

(Qs 6, 7 and 8) The number of incidents (NOI) in a factory follows Poisson distribution with mean number of incident (MNOI) per month as μ=25.

6. The lower control limit (LCL) and the upper control limit (UCL) for NOI (for 95% spread over mean), respectively are
    a. LCL= 4, UCL=28
    b. LCL= 15.2, UCL= 34.8
    c. LCL= 10, UCL= 40
    d. LCL= 0, UCL= 32

Answer: Option b

LCL= $\mu - 1.96 \times \sqrt{\mu}$ =25−1.96×5= 15.2

UCL= $\mu + 1.96 \times \sqrt{\mu}$ =25 + 1.96×5= 34.8

7. What is the actual process spread?
    a. 5
    b. 15
    c. 25
    d. 30

Answer: Option d

Solution: Process spread = $6\sigma = 6\sqrt{\mu}$ = 6*5 = 30

8. What is the loss function L(NOI) if the loss coefficient = 0.1?
    a. 2.5
    b. 25
    c. 62.5
    d. 625

Answer: Option c

Solution: Loss function L(NOI) = $q_0(NOI)^2$ = 0.1*25 * 25 = 62.5

9. Process capability analysis involves estimating (check all that apply)
    a. Process mean
    b. Process median
    c. Process standard deviation
    d. Process variance

    Answer: Options a,c,d

10. The risk control system (RCS) safety capability index (RCSCI) for a system was calculated to be 1.3. It indicates that the RCS safety performance is
    a. Ok
    b. Needs improvement
    c. Improving over time
    d. Cannot be determined

Answer: option c

Solution: Since the RCSCI >1, the system safety performance is improving.