

# **ASQ Certified Reliability Engineer (CRE) - 5-Day Study Plan TOC**

## **Day 1: Reliability Fundamentals & Risk Management**

- 1. Introduction to Reliability Engineering**
  - a. Definitions and basic concepts
  - b. Reliability vs. quality
  - c. Reliability metrics (MTBF, MTTR, availability)
- 2. Statistical Distributions and Reliability Functions**
  - a. Exponential, Weibull, Normal, Lognormal
  - b. Hazard rate functions
- 3. Risk Management**
  - a. Risk assessment techniques
  - b. FMEA/FMECA
  - c. Fault Tree Analysis (FTA)
  - d. Reliability-centered maintenance (RCM)

## **Day 2: Design and Development for Reliability**

- 1. Reliability Design Techniques**
  - a. Design for Reliability (DfR)
  - b. Robust design (Taguchi methods)
  - c. Derating, redundancy, and stress-strength analysis
- 2. System Reliability Modeling**
  - a. Block diagrams
  - b. Reliability of series, parallel, and k-out-of-n systems
- 3. Software Reliability**
  - a. Software failure models
  - b. Software testing methods

## **Day 3: Modeling and Prediction**

### **1. Reliability Prediction Methods**

- a. MIL-HDBK-217, Telcordia, NSWC
- b. Part stress and part count methods

### **2. Reliability Allocation**

- a. Apportionment methods (ARINC, AGREE, equal apportionment)

### **3. Reliability Growth Modeling**

- a. Duane model
- b. AMSAA/NHPP

### **4. Maintainability and Availability**

- a. Maintenance concepts
- b. Maintainability prediction and metrics
- c. Availability types and calculations

## **Day 4: Data Collection, Analysis, and Test Strategies**

### **1. Data Types and Sources**

- a. Life data, field data, warranty data
- b. Data cleansing and censoring

### **2. Life Data Analysis**

- a. Weibull analysis
- b. Parametric and non-parametric methods
- c. Confidence intervals

### **3. Test Strategies**

- a. Reliability testing (e.g., ALT, HALT, HASS)
- b. Test plans and test-to-failure
- c. Accelerated life testing
- d. Environmental and stress testing

## **Day 5: Management, Safety, and Review**

### **1. Reliability Program Management**

- a. Planning and budgeting
- b. Program life cycle

- c. Standards and policies (ISO, IEC)

## **2. Human Factors and Safety**

- a. Human reliability
- b. Safety assessment
- c. Hazard analysis

## **3. Ethical Responsibilities**

- a. ASQ Code of Ethics
- b. Professional responsibility

## **4. Mock Exam & Review**

- a. Full-length practice exam
- b. Review of missed questions
- c. Exam-taking strategies and time management