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#1 Process Certification Guide

ASQ CRE

ASQ RELIABILITY ENGINEER CERTIFICATION QUESTIONS & ANSWERS

Exam Summary – Syllabus – Questions

CRE

ASQ Certified Reliability Engineer (CRE)

150 Questions Exam – 550/750 Cut Score – Duration of 240 minutes

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Know Your CRE Certification Well:

The CRE is best suitable for candidates who want to gain knowledge in the ASQ Quality Control. Before you start your CRE preparation you may struggle to get all the crucial Reliability Engineer materials like CRE syllabus, sample questions, study guide.

But don't worry the CRE PDF is here to help you prepare in a stress free manner.

The PDF is a combination of all your queries like-

- What is in the CRE syllabus?
- How many questions are there in the CRE exam?
- Which Practice test would help me to pass the CRE exam at the first attempt?

Passing the CRE exam makes you ASQ Certified Reliability Engineer (CRE). Having the Reliability Engineer certification opens multiple opportunities for you. You can grab a new job, get a higher salary or simply get recognition within your current organization.

ASQ CRE Reliability Engineer Certification Details:

Exam Name	ASQ Certified Reliability Engineer
Exam Code	CRE
ASQ MEMBERS Exam Fee	USD $398
ASQ NON-MEMBERS Exam Fee	USD $498
RETAKES Exam Fee	USD $298
Application Fee	USD $70
Exam Duration	240 Minutes
Number of Questions	150
Passing Score	550/750
Format	Multiple Choice Questions
Schedule Exam	**Pearson VUE**
Sample Questions	**ASQ CRE Exam Sample Questions and Answers**
Practice Exam	**ASQ Certified Reliability Engineer (CRE) Practice Test**

CRE Syllabus:

I. Reliability Fundamentals (25 questions)	
A. Leadership Foundations	1. Benefits of reliability engineering - Describe the value that reliability has on achieving company goals and objectives, and how reliability engineering techniques and methods improve programs, processes, products, systems, and services. (Understand) 2. Interrelationship of safety, quality, and reliability - Describe the relationship of and distinguish between reliability and quality, and describe the importance of safety in reliability engineering and how reliability impacts safety. (Understand)) 3. Reliability engineer leadership responsibilities - Describe how to be a reliability champion by influencing program decisions and facilitating cross-functional communication. (Understand) 4. Reliability engineer role and responsibilities in the product life cycle - Describe how the reliability engineer influences the product life cycle, and describe a reliability engineer's role in the design review process in order to anticipate how reliability can impact risk and costs, and ensure performance over time. (Understand) 5. Function of reliability in engineering - Describe how reliability techniques can be used to apply best practices in engineering (e.g., measuring reliability early), how industry standards can impact reliability, and how reliability can inform the decision analysis process. (Analyze) 6. Ethics in reliability engineering - Identify appropriate ethical behaviors for a reliability engineer in various situations. (Evaluate) 7. Supplier reliability assessments - Explain how supplier reliability impacts the overall reliability program and describe key reliability concepts that should be included in supplier reliability assessments. (Analyze) 8. Performance monitoring - Describe the importance of performance monitoring to ensure that product reliability or safety requirements continue to be met, and identify life-cycle points in which process and product reliability data are collected and evaluated. (Understand)
B. Reliability Foundations	1. Basic reliability terminology - Explain basic terms related to reliability and the associated metrics (e.g., MTTF, MTBF, MTTR, service interval, maintainability, availability, failure rate, reliability, and bathtub curve). (Apply) 2. Drivers of reliability requirements and targets - Describe how customer expectations and industry standards, safety, liability, and regulatory concerns drive reliability requirements. (Understand) 3. Corrective and preventive action (CAPA) - Identify corrective and preventive actions to take in specific

	situations and evaluate their measures of effectiveness. (Evaluate) 4. Root cause analysis - Describe root cause analysis, and use a root cause and failure analysis tool to determine the causes of degradation or failure. (Evaluate) 5. Product life-cycle engineering stages - Describe the impact various life-cycle stages (concept/design, development/test, introduction, growth, maturity, decline) have on reliability, and the cost issues (product maintenance, life ex-pectation, software defect phase containment, etc.) associated with those stages. (Understand) 6. Economics of product maintainability and availability - Describe the cost tradeoffs associated with product maintainability strategies and availability. (Understand) 7. Cost of poor reliability - Describe how poor reliability affects costs over the life cycle. (Understand) 8. Quality triangle - Describe the relationship be-tween cost, time, and quality with respect to reliability. (Understand) 9. Six Sigma methodologies - Describe how Six Sigma principles support reliability engineering. (Understand) 10. Systems engineering and integration - Describe the role of reliability engineering within systems engineering, including the integration of components and their interfaces/interactions within the system. (Understand)
II. Risk Management (25 questions)	
A. Identification	1. Risk management techniques - Use risk management tools and processes to identify, document, and track concerns. Identify and prioritize safety, economic, performance, and customer satisfaction concerns utilizing an appropriate risk management framework. (Analyze) 2. Types of risk - Identify the various types of risks, including technical, scheduling, safety, and financial, and describe their relationship to reliability. (Analyze)
B. Analysis	1. Fault tree analysis (FTA) - Use fault tree analysis (FTA) techniques to evaluate product or process failure. (Analyze) 2. Failure mode and effects analysis (FMEA) - Define and distinguish between failure mode and effects analysis (FMEA) and failure mode, effects, and criticality analysis (FMECA) and apply these techniques to systems, products, processes, and designs. (Evaluate) 3. Common mode failure analysis - Describe common mode failure (also known as common cause failure) and how it affects risk. (Understand)

	4. Hazard analysis - Describe how hazard analysis informs the development process, and how information obtained as a result of the hazard analysis is used by the reliability engineer. (Understand) 5. Risk matrix - Describe how risk matrices are used in the assessment of risk in regard to likelihood and severity. (Understand) 6. System safety - Identify safety-related issues by analyzing customer feedback, design data, field data, and other information. Prioritize safety concerns, and identify steps that will minimize the improper use of equipment, products, or processes. (Evaluate)
C. Mitigation	- Identify appropriate risk mitigation (treatment) plans to include controls that will minimize risk and subsequent impact in terms of safety, liability, and regulatory compliance. (Evaluate)
III. Probability and Statistics for Reliability (35 questions)	
A. Basic Concepts	1. Basic statistics - Define various basic statistical terms (e.g., population, parameter, statistic, sample, the central limit theorem, parametric, and nonparametric), and compute and interpret their values. (Analyze) 2. Basic probability concepts - Use basic probability concepts (e.g., independence, mutually exclusive, conditional probability), and compute and interpret the expected values. (Analyze) 3. Probability distributions - Compare and contrast various distributions (e.g., binomial, Poisson, exponential, Weibull, normal, and log-normal), and recognize their associated probability plots. (Analyze) 4. Probability functions - Compare and contrast various probability functions (e.g., cumulative distribution functions (CDFs), probability density functions (PDFs), and hazard functions), and recognize their application in various situations. (Apply) 5. Sampling plans for statistics and reliability testing - Use various theories, tables, and formulas to determine appropriate sample sizes or testing time for statistical and reliability testing. (Apply) 6. Statistical process control (SPC) and process capability studies (Cp, Cpk) - Define and describe SPC and process capability studies (Cp, Cpk, etc.), control charts, and how each is related to reliability. (Understand) 7. Confidence and tolerance intervals - Compute confidence intervals and tolerance intervals, draw conclusions from the results, and describe how point estimates are used to determine the interval. (Evaluate)

B. Data Management	1. Sources and uses of reliability data - Describe sources of reliability data (prototype, development, test, field, warranty, published, etc.), their advantages and limitations, and how the data can be used to measure and enhance product reliability. (Analyze) 2. Types of data - Identify and distinguish between various types of data (e.g., attributes vs. variable, discrete vs. continuous, censored vs. complete, and univariate vs. multivariate). Select appropriate analysis tools based on the data type. (Evaluate) 3. Data collection methods - Identify and select appropriate data collection methods (e.g., surveys, automated tests, automated monitoring, and reporting tools) in order to meet various data analysis objectives and data quality needs. (Evaluate) 4. Data summary and reporting - Examine collected data for accuracy and usefulness. Analyze, interpret, and summarize data for presentation using various techniques, based on data types, sources, and required output. (Create) 5. Failure analysis methods - Describe failure analysis tools and methods (e.g., mechanical, materials, physical analysis, and scanning electron microscopy (SEM)) that are used to identify failure mechanisms. (Understand) 6. Failure reporting, analysis, and corrective action system (FRACAS) - Identify elements necessary for FRACAS, and demonstrate the importance of a closed-loop process. (Evaluate)
IV. Reliability Planning, Testing, and Modeling (35 questions)	
A. Planning	1. Reliability test strategies - Develop and apply the appropriate test strategies (e.g., truncation, test-to-failure, degradation, growth plan, and test, analyze, and fix (TAAF)) for various product development phases. (Evaluate) 2. Environmental and conditions of use factors - Identify environmental and use factors (e.g., temperature, humidity, and vibration) and stresses (e.g., severity of service, electrostatic discharge (ESD), throughput, and duty cycle) to which a product may be subjected. (Analyze) 3. Failure consequence - Describe the importance of identifying the consequences of failure modes when establishing reliability acceptance criteria. (Understand) 4. Failure criteria - Define and describe failure criteria based on system requirements and warranty terms and conditions. (Understand) 5. Test environment - Appraise the environment in terms of system location and

	operational conditions, and designate the environment in the test plan to ensure an appropriate test strategy is implemented. (Evaluate)
B. Testing	Describe the purpose, advantages, and limitations of each of the following types of tests, and use common models to develop test plans, evaluate risks, and interpret test results. (Evaluate) 1. Accelerated life tests - (single-stress, multiple-stress, sequential stress, step-stress, HALT, margin tests) 2. Stress screening - (ESS, HASS, burn-in tests) 3. Qualification/Demonstration testing - (sequential tests, fixed-length tests) 4. Degradation (wear-to-failure) testing 5. Software testing - (white-box, black-box, operational profile, and fault-injection)
C. Modeling	1. Reliability block diagrams and models - Generate and analyze various types of block diagrams and models, including series, parallel, partial redundancy, and time-dependent. (Evaluate) 2. Physics of failure and failure mechanisms - Identify various potential failure mechanisms (e.g., fracture, corrosion, memory corruption) and describe the physical process of these failures. (Apply) 3. Failure models - Select appropriate theoretical models (e.g., Arrhenius, S-N curve) to assess or predict failure rates. (Analyze) 4. Reliability prediction methods - Use various reliability prediction methods (e.g., Monte Carlo Simulation, part stress analysis, and parts count prediction) for both repairable and nonrepairable components and systems, and describe the inputs into the model. (Apply) 5. Design prototyping - Describe the advantages and limitations of prototyping to enhance product reliability. (Understand)
V. Life-Cycle Reliability (30 questions)	
A. Reliability Design Techniques	1. Design evaluation techniques (validation and verification) - Explain how validation, verification, and other review techniques are used to assess the reliability of a product's design at various life-cycle stages. (Apply) 2. Stress-strength analysis - Apply the stress-strength analysis method of calculating probability of failure, and interpret the results. (Analyze) 3. Design of experiments (DOE) - Develop and interpret the results of a standard design of experiments (DOE) (e.g., full factorial and fractional factorial). (Analyze) 4. Reliability optimization

	- Use various approaches to optimize reliability within the constraints of cost, schedule, weight, and other design requirements. (Apply) 5. Human factors - Describe the relationship between human factors and reliability engi-neering, including user safety, user and usage profiles, failure modes, and mechanisms. (Understand) 6. Design for X (DFX) - Apply DFX techniques such as design for manufacturability, testability, and maintainability. (Apply) 7. Design for Reliability (DfR) - Apply DfR in order to meet reliability requirements throughout the product or system life cycle. Understand how built-in reliability and fault tolerance/avoidance are key goals for design for reliability. (Evaluate)
B. Parts and Systems Development	1. Materials and components selection techniques - Apply techniques (e.g., derating and commercial off-the-shelf (COTS)) for selecting materials and components to meet reliability goals and requirements. (Analyze) 2. Parts standardizationand system simplification - Describe the importance of standardization, simplification, and parts re-use to meet reliability goals and requirements. (Apply)
C. Maintainability	1. Maintenance strategies - Develop a maintenance plan incorporating various strategies (e.g., predictive maintenance, repair or replace decision making, spare parts analysis/forecasting, and equipment warranties). (Apply) 2. Preventive maintenance (PM) analysis - Define and use PM tasks, optimum PM intervals, and other elements of this analysis. Identify situations when PM is not effective. (Apply) 3. Corrective maintenance analysis - Describe and apply the elements of corrective maintenance analysis (e.g., fault-isolation time, repair/replace time, skill level, and crew hours). (Apply)

ASQ CRE Sample Questions:

Question: 1

Who should be chairperson of a design review committee?

a) A senior member of management.
b) The chief designer.
c) The person best able to make decisions on a design.
d) The reliability engineer.

Answer: c

Question: 2

When assessing failures during a reliability test program, which of the following should a reliability engineer consider first?

a) The capability of test equipment
b) The hazard rate is constant
c) The hazard rate is decreasing.
d) The hazard rate is increasing.

Answer: b

Question: 3

The main reason for the use of Quality Function Deployment (QFD) is which of the following?

a) To implement the voice of the customer.
b) To ensure concurrent engineering.
c) To assign responsibilities for product designs.
d) To provide a structured product design approach.

Answer: a

Question: 4

Failure modes and effects analysis involves what activity?

a) The determination of the probability of failure in a specified period of time.
b) The expected number of failures in a given time interval.
c) A study of the probability of success in a given time period.
d) The study of the physics of failure to determine exactly how a product fails and what causes the failure.

Answer: d

Question: 5

A failure reporting and corrective action system should ensure that all steps are taken to:

a) Determine responsibilities for failures.
b) Record costs associated with the corrective action.
c) Identify, investigate and analyze failures.
d) Define the goals of the FRACAS team.

Answer: c

Question: 6

Which one of the following quantitative methods does NOT apply to the assessment of actual system/component reliability?

a) Statistical analysis of field test data.
b) Statistical allocation of reliability goals.
c) Evaluation of laboratory and acceptance test data.
d) Analysis of result for reliability demonstration test.

Answer: b

Question: 7

What type of failure is usually reduced by periodic overhaul and replacement of component parts?

a) Early life.
b) Wear out.
c) Random.
d) Catastrophic.

Answer: b

Question: 8

What is the MOST accurate method to verify that the maintainability requirement of a design is being met?

a) By analysis of the design.
b) By performing maintainability prediction.
c) By thorough design reviews.
d) By demonstration at the customer's facility.

Answer: d

Question: 9

Pascal's triangle presents a simple means of determining which of the various terms of the binomial expansion?

a) Exponents
b) Coefficients
c) Combinations
d) Permutations

Answer: b

Question: 10

If the average repair time for a system is 3 hours and the MTBMA is 122 hours, what is the operational availability?

a) 0.976
b) 0.982
c) 0.997
d) 0.975

Answer: d

Study Guide to Crack ASQ Reliability Engineer CRE Exam:

- Getting details of the CRE syllabus, is the first step of a study plan. This pdf is going to be of ultimate help. Completion of the syllabus is must to pass the CRE exam.
- Making a schedule is vital. A structured method of preparation leads to success. A candidate must plan his schedule and follow it rigorously to attain success.
- Joining the ASQ provided training for CRE exam could be of much help. If there is specific training for the exam, you can discover it from the link above.
- Read from the CRE sample questions to gain your idea about the actual exam questions. In this PDF useful sample questions are provided to make your exam preparation easy.
- Practicing on CRE practice tests is must. Continuous practice will make you an expert in all syllabus areas.

Reliable Online Practice Test for CRE Certification

Make ProcessExam.com your best friend during your ASQ Certified Reliability Engineer exam preparation. We provide authentic practice tests for the CRE exam. Experts design these online practice tests, so we can offer you an exclusive experience of taking the actual CRE exam. We guarantee you 100% success in your first exam attempt if you continue practicing regularly. Don't bother if you don't get 100% marks in initial practice exam attempts. Just utilize the result section to know your strengths and weaknesses and prepare according to that until you get 100% with our practice tests. Our evaluation makes you confident, and you can score high in the CRE exam.

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