CQPA

CERTIFIED QUALITY PROCESS ANALYST

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Certification from ASQ is considered a mark of quality excellence in many industries. It helps you advance your career, and boosts your organization's bottom line through your mastery of quality skills. Becoming certified as a Quality Process Analyst confirms your commitment to quality and the positive impact it will have on your organization.

Examination

Each certification candidate is required to pass an examination that consists of multiple-choice questions that measure comprehension of the body of knowledge.

Certified Quality Process Analyst

The Certified Quality Process Analyst (CQPA) is a paraprofessional who, in support of and under the direction of quality engineers or supervisors, analyzes and solves quality problems and is involved in quality improvement projects. A Certified Quality Process Analyst may be a recent graduate or someone with work experience who wants to demonstrate his or her knowledge of quality tools and processes.

CQPA

Computer Delivered – The CQPA examination is a one-part, 110-question, four-hour-and-eighteen-minute exam and is offered in English only. One hundred questions are scored and 10 are unscored.

Paper and Pencil – the CQPA examination is a one-part, 100-question, four-hour exam and is offered in English only.

Education and/or Experience

You must have two years of work experience or an associate degree at a minimum.

For comprehensive exam information on Certified Quality Process Analyst certification, visit **asq.org/cert**.

Certified Quality Process Analyst (CQPA)

Topics in this body of knowledge (BoK) are explanations (subtext) and cognitive levels for each topic or subtopic in the test. These details will be used by the Examination Development Committee as guidelines for writing test questions and are designed to help candidates prepare for the exam by identifying specific content within each topic that can be tested. Except where specified, the subtext is not intended to limit the subject or be all-inclusive of what might be covered in an exam but is intended to clarify how topics are related to the role of the Certified Quality Process Analyst (CQPA). The descriptor in parentheses at the end of each subtext entry refers to the highest cognitive level at which the topic will be tested. A complete description of cognitive levels is provided at the end of this document.

I. Quality Concepts and Team Dynamics (20 Questions)

A. Professional Conduct and Ethics

Identify and apply behaviors that are aligned with the ASQ Code of Ethics. (Apply)

B. Quality Concepts

1. **Quality**

   Describe how using quality techniques to improve processes, products, and services can benefit all parts of an organization. Describe what quality means to various stakeholders (e.g., employees, organization, customers, suppliers, community) and how each can benefit from quality. (Understand)

2. **Quality planning**

   Define a quality plan, describe its purpose for the organization as a whole, and know who has responsibility for contributing to its development. (Understand)

3. **Quality standards, requirements, and specifications**

   Define and distinguish between national or international standards, customer requirements, and product or process specifications. (Understand)

4. **Quality documentation**

   Identify and describe common elements of various document control systems, including configuration management. Describe the relationship between quality manuals, procedures, and work instructions. (Understand)

5. **Cost of quality (COQ)**

   Define and describe the four cost of quality categories: prevention, appraisal, internal failure, and external failure. (Understand)

C. Quality Audits

1. **Audit types**
   Define and distinguish between basic audit types, including internal and external audits; product, process, and systems audits; and first-, second-, and third-party audits. (Understand)

2. **Audit components**
   Identify various elements of the audit process, including audit purpose and scope, the standard to audit against, audit planning (preparation) and performance, opening and closing meetings, final audit report, and verification of corrective actions. (Understand)

3. **Audit roles and responsibilities**
   Identify and describe the roles and responsibilities of key audit participants: lead auditor, audit team member, client, and auditee. (Understand)

D. Team Dynamics

1. **Types of teams**
   Distinguish between various types of teams: process improvement teams, workgroups/workcells, self-managed teams, temporary/ad hoc project teams, and cross-functional teams. (Analyze)

2. **Team development**
   Identify various elements in team building, such as inviting team members to share information about themselves during the initial meeting, using ice-breaker activities to enhance team membership, and developing a common vision and agreement on team objectives. (Apply)

3. **Team stages**
   Describe the classic stages of team evolution: forming, storming, norming, performing, and adjourning. (Understand)

4. **Team roles and responsibilities**
   Describe the roles and responsibilities of various team stakeholders: sponsor, champion, facilitator, team leader, and team member. (Understand)

5. **Team conflict**
   Identify common group challenges, including groupthink, members with hidden and/or competing agendas, intentional distractions, and other disruptive behaviors. Describe ways of resolving these issues and keeping team members on task. (Understand)

E. Training and Evaluation

Describe various elements of training, including linking the training to organizational goals, identifying training needs, adapting information to meet adult learning styles, and using coaching and peer training methods. Describe various tools to measure the effectiveness of the training, including post-training feedback, end-of-course tests, and individual and department performance improvement measures. (Understand)

II. Quality Tools and Process Improvement Techniques (26 Questions)

A. Process Improvement Concepts and Approaches

Define and explain elements of Plan-Do-Check-Act (PDCA), kaizen activities, incremental and breakthrough improvement, and DMAIC phases (define, measure, analyze, improve, control). (Apply)

B. Basic Quality Tools

Select, construct, apply, and interpret the seven basic quality tools: 1) cause and effect diagrams, 2) flowcharts (process maps), 3) check sheets, 4) Pareto charts, 5) scatter diagrams, 6) run charts and control charts, and 7) histograms. (Evaluate)

C. Process Improvement Techniques

1. **Lean**
   Identify and apply lean concepts and tools, including set-up reduction (SUR), pull (including just-in-time (JIT) and kanban), 5S, continuous flow manufacturing (CFM), value-added analysis, value stream mapping, theory of constraints (TOC), poka-yoke, and total productive/predictive maintenance (TPM) to reduce waste in areas of cost, inventory, labor, and distance. (Apply)

2. **Six Sigma**
   Identify key Six Sigma concepts, including variation reduction, voice of the customer (VOC), belt levels (yellow, green, black, master black), and their roles and responsibilities. (Understand)

3. **Benchmarking**
   Define and describe this technique and how it can be used to support best practices. (Understand)

4. **Risk management**
   Recognize the types of risk that can occur throughout the organization, such as scheduling, shipping/receiving, financials, operations and supply chain, employee and user safety, and regulatory compliance and changes. Describe risk control and mitigation methods: avoidance, reduction, prevention, segregation, and transfer. (Understand)

5. **Business process management (BPM)**
   Define and describe this continuous process improvement practice, including the business process lifecycle phases (Design, Modeling, Execution, Monitoring, and Optimization). (Understand)

D. Management and Planning Tools

1. **Quality management tools**
   Select and apply affinity diagrams, tree diagrams, process decision program charts, matrix diagrams, interrelationship digraphs, prioritization matrices, and activity network diagrams. (Apply)

2. **Project management tools**
   Select and interpret scheduling and monitoring tools, such as Gantt charts, program evaluation and review technique (PERT), and critical path method (CPM). (Apply)

III. Data Analysis (33 Questions)

A. Basic Concepts

1. **Basic statistics**
   Define, calculate, and interpret measures of central tendency (mean, median, mode) and measures of dispersion (standard deviation, range, variance). (Analyze)

2. **Basic distributions**
   Define and explain frequency distributions (normal, binomial, Poisson, and Weibull) and the characteristics of skewed and bimodal distributions. (Understand)

3. **Probability concepts**
   Describe and use probability concepts: independent and mutually exclusive events, combinations, permutations, additive and multiplicative rules, and conditional probability. Perform basic probability calculations. (Apply)

4. **Reliability concepts**
   Define basic reliability concepts: mean time to failure (MTTF), mean time between failures (MTBF), mean time between maintenance (MTBM), and mean time to repair (MTTR). Identify elements of the bathtub curve model and how they are used to predict failure patterns. (Remember)

B. Data Types, Collection, and Integrity

1. **Measurement scales**
   Define and use nominal, ordinal, interval, and ratio measurement scales. (Apply)

2. **Data types**
   Identify, define, and classify data in terms of continuous (variables) and discrete (attributes or counts). Determine when it is appropriate to convert attributes data to variables measures. (Apply)

3. **Data collection and analysis**
   Identify and describe the advantages of collecting and analyzing real-time data. (Understand)

4. **Data integrity**
   Recognize methods that verify data validity and reliability from source through data analysis using various techniques such as auditing trails, vendor qualification, error detection software, training for record management, etc., to prevent and detect data integrity issues. (Apply)

5. **Data plotting**
   Identify the advantages and limitations of using this method to analyze data visually. (Understand)

C. Sampling

1. **Sampling methods**
   Define and distinguish between various sampling methods, such as random, sequential, stratified, systemic/fixed sampling, rational subgroup sampling, and attributes and variables sampling. (Understand)

2. **Acceptance sampling**
   Identify and define sampling characteristics, such as lot size, sample size, acceptance number, and operating characteristic (OC) curve. Identify when to use the probability approach to acceptance sampling. (Understand)

D. Measurement System Analysis

Define and distinguish between accuracy, precision, repeatability and reproducibility (gage R&R) studies, bias, and linearity. (Apply)

E. Statistical Process Control (SPC)

1. **Fundamental concepts**
   Distinguish between control limits and specification limits, and between process stability and process capability. (Apply)

2. **Rational subgroups**
   Explain and apply the principles of rational subgroups. (Apply)

3. **Control charts for attributes data**
   Identify, select, and interpret control charts (p, np, c, and u) for data that is measured in terms of discrete attributes or discrete counts. (Analyze)

4. **Control charts for variables data**
   Identify, select, and interpret control charts ($\bar{X}$-R, $\bar{X}$-s and $\bar{X}$mR) for data that is measured on a continuous scale. (Analyze)

5. **Common and special cause variation**
   Interpret various control chart patterns (runs, hugging, trends) to determine process control, and use SPC rules to distinguish between common cause and special cause variation. (Analyze)

6. **Process capability measures**
   Describe the conditions that must be met in order to measure capability. Calculate C_p, C_{pk}, P_p, and P_{pk} measures and interpret their results. (Analyze)

F. Advanced Statistical Analysis

1. **Regression and correlation models**
   Describe how these models are used for estimation and prediction. (Apply)

2. **Hypothesis testing**
   Calculate confidence intervals using t tests and the z statistic and determine whether the result is significant. (Analyze)

3. **Design of experiments (DOE)**
   Define and explain basic DOE terms: response, factors, levels, treatment, interaction effects, randomization, error, and blocking. (Understand)

4. **Taguchi concepts and methods**
   Identify and describe Taguchi concepts: quality loss function, robustness, controllable and uncontrollable factors, and signal to noise ratio. (Understand)

5. **Analysis of variance (ANOVA)**
   Define key elements of ANOVAs and how the results can be used. (Understand)

IV. Customer-Supplier Relations (13 Questions)

A. Internal and External Customers and Suppliers

Define and distinguish between internal and external customers and suppliers. Describe their impact on products, services, and processes, and identify strategies for working with them to make improvements. (Apply)

B. Customer Satisfaction Methods

Describe the different types of tools used to gather customer feedback: surveys, focus groups, complaint forms, and warranty analysis. Explain key elements of quality function deployment (QFD) for understanding and translating the voice of the customer. (Understand)

C. Product and Process Approval Systems

Describe how validation and qualification methods, including beta testing, first-article, in-process, and final inspection are used to approve new or updated products, processes, and services. (Understand)

D. Supplier Management

1. **Supplier selection**
   Describe and outline criteria for selecting, approving, and classifying suppliers, including internal rating programs and external certification standard requirements, including environmental/social responsibility. (Understand)

2. **Supplier performance**
   Describe supplier performance in terms of measures such as quality (e.g., defect rates, functional performance), price, delivery speed, delivery reliability, level of service, and technical support. (Understand)

E. Material Identification, Status, and Traceability

Describe the importance of identifying material by lot, batch, source, and conformance status, including impact for recalls. Describe key requirements for preserving the identity of a product and its origin. Use various methods to segregate nonconforming material and process it according to procedures. (Apply)

V. Corrective and Preventive Action (CAPA) (8 Questions)

A. Corrective Action

Demonstrate key elements of the corrective action process: identify the problem, contain the problem, determine the root causes, propose solutions to eliminate and prevent their recurrence, verify that the solutions are implemented, and confirm their effectiveness. (Apply)

B. Preventive Action

Demonstrate key elements of a preventive action process: track data trends and patterns, use failure mode and effects analysis (FMEA), review product and process monitoring reports, and study the process to identify potential failures, defects, or deficiencies. Improve the process by developing error/mistake-proofing methods and procedural changes, verify that the changes are made, and confirm their effectiveness. (Apply)

LEVELS OF COGNITION

Based on Bloom's Taxonomy—Revised (2001)

In addition to **content** specifics, the subtext for each topic in this BoK also indicates the intended **complexity level** of the test questions for that topic. These levels are based on "Levels of Cognition" (from Bloom's Taxonomy—Revised, 2001) and are presented below in rank order, from least complex to most complex.

REMEMBER | Recall or recognize terms, definitions, facts, ideas, materials, patterns, sequences, methods, principles, etc.

UNDERSTAND | Read and understand descriptions, communications, reports, tables, diagrams, directions, regulations, etc.

APPLY | Know when and how to use ideas, procedures, methods, formulas, principles, theories, etc.

ANALYZE | Break down information into its constituent parts and recognize their relationship to one another and how they are organized; identify sublevel factors or salient data from a complex scenario.

EVALUATE | Make judgments about the value of proposed ideas, solutions, etc., by comparing the proposal to specific criteria or standards.

CREATE | Put parts or elements together in such a way as to reveal a pattern or structure not clearly there before; identify which data or information from a complex set is appropriate to examine further or from which supported conclusions can be drawn.

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2020 CQPA BoK

Item B1462

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