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.

Information

Certified Quality Process Analyst

The Certified Quality Process Analyst 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.

Examination

Each certification candidate is required to pass a written examination that consists of multiple-choice questions that measure comprehension of the Body of Knowledge. The Certified Quality Process Analyst examination is a one-part, 100-question, four-hour exam and is offered in English.

Education and/or Experience

You must have two years of work experience or an associate degree or two years of equivalent higher education.

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

Body of Knowledge

Certified Quality Process Analyst (CQPA)

The 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 Tools
(22 Questions)

A. Quality Concepts

1. **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)
2. **Quality standards, requirements, and specifications**
   Define and distinguish between national or international standards, customer requirements, and product or process specifications. (Understand)
3. **Cost of quality (COQ)**
   Define and describe the four basic cost of quality categories: prevention, appraisal, internal failure, external failure. (Understand)
4. **Quality documentation**
   Identify and describe common elements of various document control systems, including configuration management, and describe the relationship between quality manuals, procedures, and work instructions. (Understand)

B. 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)

C. 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) control charts, and 7) histograms. (Evaluate)

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-building techniques**
   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 roles and responsibilities**
   Describe the roles and responsibilities of various team stakeholders: sponsor, champion, facilitator, team leader, team member. (Understand)
4. **Team conflict**
   Identify common group challenges, including members with hidden agendas, intentional distractions, and other disruptive behaviors. Describe ways of resolving these issues and keeping team members on task. (Understand)
5. **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. Use various tools to measure the effectiveness of the training, including post-training feedback, end-of-course tests, and individual and department performance improvements measures. (Understand)

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

II Problem Solving and Improvement (22 Questions)

A. Continuous Improvement Models
Define and explain elements of plan-do-check-act (PDCA), kaizen, and incremental and breakthrough improvement. (Apply)

B. Process Improvement Techniques

1. **Six Sigma**
   Identify key Six Sigma concepts and tools, including Green Belt and Black Belt roles and responsibilities, project types and processes used, and Six Sigma DMAIC phases, design, measure, analyze, improve, and sustaining control. (Understand)
2. **Lean**
   Identify and apply lean tools and processes, including set-up reduction (SUR), pull (including just-in-time [JIT] and kanban), 5S, continuous flow manufacturing (CFM), value stream, poka-yoke, and total productive/predictive maintenance (TPM) to reduce waste in areas of cost, inventory, labor, and distance. (Apply)
3. **Benchmarking**
   Define and describe this technique and how it can be used to support best practices. (Understand)

C. Project and Quality Management Tools

1. **Basic 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). (Analyze)

D. Taguchi Loss Function
Identify and describe Taguchi concepts: signal-to-noise ratio, controllable and uncontrollable factors, and robustness. (Understand)

III Data Analysis (33 Questions)

A. Terms and Definitions

1. **Basic statistics**
   Define, calculate, and interpret measures of central tendency (mean, median, mode) and measures of dispersion (standard deviation, range, variance). (Apply)
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, 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 actions (MTBMA), mean time to repair (MTTR). Identify elements of the bathtub curve model and how they are used to predict failure patterns. (Remember)
5. **Measurement scales**
   Define and use nominal, ordinal, interval, and ratio measurement scales. (Apply)

B. Data Types and Data Collection Methods
Identify, define, and classify in terms of continuous (variables) and discrete (attributes) data. Determine when it is appropriate to convert attributes data to variables measures. Distinguish between collecting data and generating useful information, and describe the planning and implementation steps that will support meaningful output. (Apply)

C. Sampling

1. **Characteristics**
   Identify and define sampling characteristics such as lot size, sample size, acceptance number, and operating characteristic (OC) curve. (Understand)
2. **Sampling methods**
   Define and distinguish between various sampling methods such as random, sequential, stratified, fixed sampling, and attributes and variables sampling. (Understand)
3. **Rational subgroups**
   Define and describe the principles of rational subgroups. (Understand)

D. Measurement System Analysis
Define and distinguish between accuracy, precision, repeatability and reproducibility (gauge R&R) studies, bias, and linearity. (Understand)

E. Statistical Process Control (SPC)

1. **Control limits and specification limits**
   Identify and distinguish between control limits and specification limits. (Understand)
2. **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)
3. **Control charts for variables data**
   Identify, select, and interpret control charts ($\overline{X}$-R, $\overline{X}$-s, and XmR) for data that is measured on a continuous scale. (Apply)
4. **Process capability measures**
   Describe the conditions that must be met in order to measure capability. Calculate Cp, Cpk, Pp, and Ppk measures and interpret their results. (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. **Data graphics**
   Identify the advantages and limitations of presenting data graphically instead of numerically. (Understand)

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 basic DOE terms: blocking, randomization, treatment, error, response, and factors. (Remember)
4. **Analysis of variance (ANOVA)**
   Define key elements of ANOVAs and how the results can be used. (Understand)

IV Customer-Supplier Relations
(15 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, complaint forms, warranty analysis. Define key elements of quality function deployment (QFD). (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
Define and describe key supplier performance measures, including quality, price, delivery, and level of service, and commonly used metrics: defect rates, functional performance, timeliness, responsiveness, and technical support. (Understand)

E. Material Identification, Status, and Traceability
Describe the importance of identifying material by lot, batch, source, and conformance status. 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
Identify and use key elements of the corrective action process: identify the problem, contain the problem, determine the causes of the problem, propose solutions to eliminate them or prevent their recurrence, verify that the solutions are implemented, and confirm their effectiveness. (Apply)

B. Preventive Action
Identify and use 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- or mistake-proofing methods and procedural changes, and verify that the changes are made and confirm their effectiveness. (Apply)

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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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