



# CANDIDATE HANDBOOK

# CMRP





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# INTRODUCTION

Headquartered in Atlanta, Georgia, the Society for Maintenance & Reliability Professionals Certifying Organization (SMRPCO) is the certifying body of the Society for Maintenance & Reliability Professionals (SMRP) – a global professional society serving over 7,500 members.

## MISSION

To develop and promote excellence in maintenance, reliability and physical asset management.

## VALUES

SMRP values data-driven excellence, sharing/collaboration, membership focus, continuous improvement, accountability, trust and respect, integrity and social responsibility.

## MEMBERS

7,500+ members worldwide with a more than 80% increase in overall membership in the past five years and 145% increase in international membership in the past five years.

## About the SMRP Certifying Organization

SMRP was formed in 1992 by practitioners from 18 different companies who were passionate about actively promoting maintenance and reliability within their field and to the public. In 1997, SMRP formed SMRPCO to create a certification program to validate the skills and knowledge of maintenance, reliability and physical asset management practitioners. Three years later, the first Certified Maintenance & Reliability Professional exam (CMRP) was administered.

## Today, SMRPCO offers three exams:

- Certified Maintenance & Reliability Professional (CMRP)
- Certified Maintenance & Reliability Technician (CMRT)
- Certified Asset Management Assessor (CAMA)\*

\* The CAMA exam is managed by the World Partners in Asset Management. For information on the CAMA exam, visit [www.wpiam.com](http://www.wpiam.com).

## Purpose of SMRPCO

SMRPCO serves to foster high standards and ethical and professional practice in the delivery of services through a recognized, credible credentialing program that assures competency of practitioners in the maintenance, reliability and physical asset management profession. SMRPCO is committed to the underlying ethics upon which the certification process rests – absolute fairness and equity in the administration of examinations and recertification for all applicants without discrimination.

## Statement of Impartiality and Nondiscrimination

SMRPCO's leadership and management, including its Certification Commission, endorse the principles of impartiality and equal opportunity, and commit to act impartially and equitably in relation to its applicants, candidates, and certificants, including but not limited to: 1) applying its standards and requirements for examinations and certifications equally to all individuals regardless of age, race, religion, gender, sexual orientation, gender identity, national origin, veteran status or disability, 2) implementing its policies and procedures impartially and fairly, 3) not restricting certification based on undue financial or other limiting conditions, and 4) not allowing

commercial, financial, or other pressures to compromise impartiality in certification activities.

## Purpose of this Guide

This guide was developed to help candidates apply and take the CMRP or CMRT exam. It also provides in-depth information on the application process, exam administration, and the rules and procedures for maintaining a SMRPCO certification after an individual achieves it.

For additional information not covered in this guide, please contact SMRPCO staff at [certify@smrp.org](mailto:certify@smrp.org).

## Important Information

The most current version of this document is available at [www.smrp.org](http://www.smrp.org).

As a candidate or certificant, you are responsible for keeping SMRPCO informed of your current contact information. If your mailing or email address changes, be sure to update your SMRP profile on the website. Failure to update SMRPCO of your contact information may result in missing important notifications about your certification.





# CERTIFIED MAINTENANCE & RELIABILITY PROFESSIONAL (CMRP) EXAM

## About the CMRP Exam

The CMRP program is the leading credential for certifying the knowledge, skills and abilities of maintenance, reliability and physical asset management professionals. The CMRP exam is a thorough test of a broad scope of expertise measured against the universal standard. It was developed to assess professionals' aptitude within the five pillars of the SMRP Body of Knowledge, which include: business and management, manufacturing process reliability, equipment reliability, organization and leadership, and work management.

## Accreditation and Recognition

The CMRP is accredited by the ANSI National Accreditation Board (ANAB), an independent third-party organization that evaluates certification programs and organization requirements on a regular basis. The CMRP exam is the only certification program of its kind accredited by ANAB under the ISO/IEC 17024 standard. Visit [www.anab.ansi.org](http://www.anab.ansi.org) to learn more about accreditation.

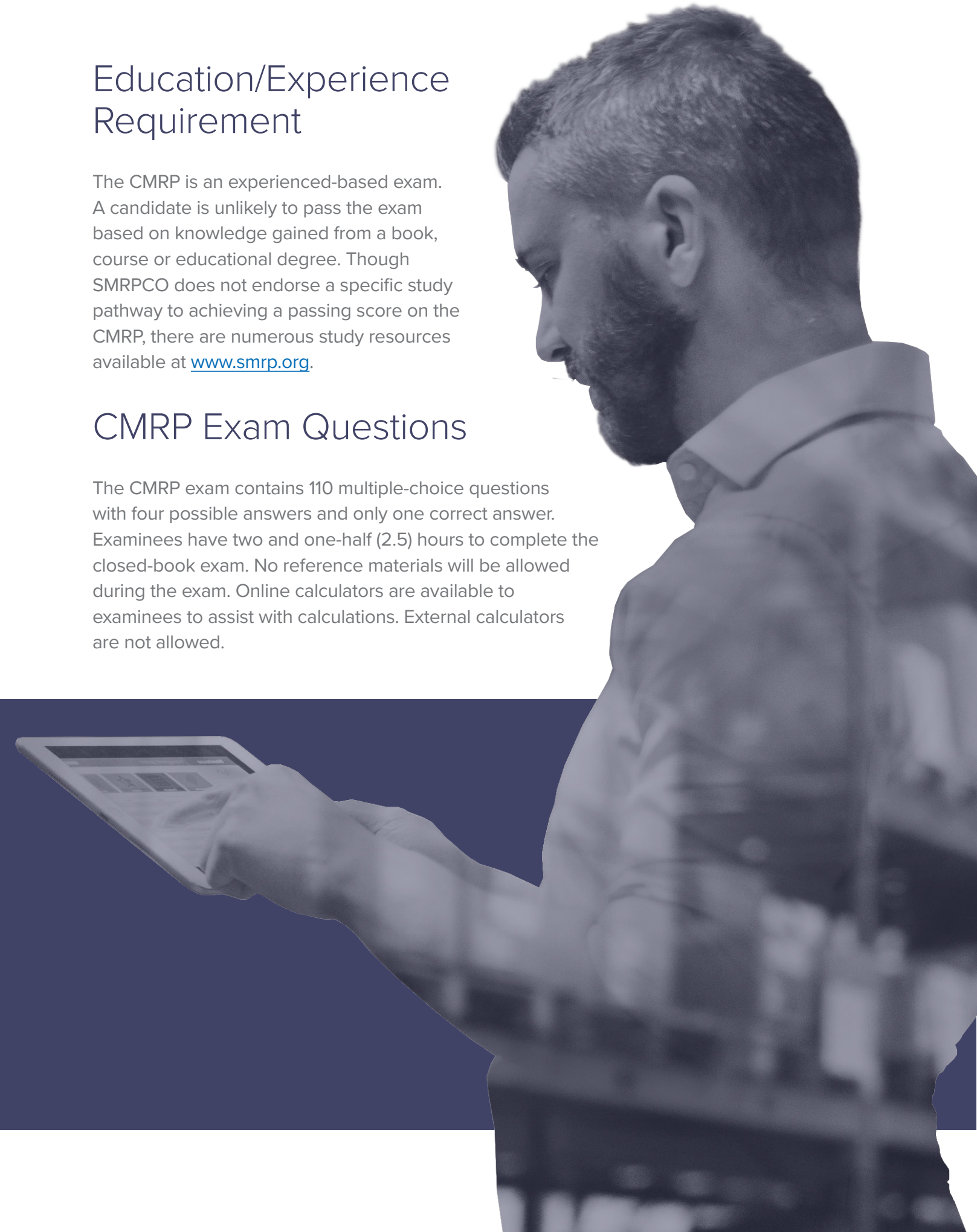


## Education/Experience Requirement

The CMRP is an experienced-based exam. A candidate is unlikely to pass the exam based on knowledge gained from a book, course or educational degree. Though SMRPCO does not endorse a specific study pathway to achieving a passing score on the CMRP, there are numerous study resources available at [www.smrp.org](http://www.smrp.org).

## CMRP Exam Questions

The CMRP exam contains 110 multiple-choice questions with four possible answers and only one correct answer. Examinees have two and one-half (2.5) hours to complete the closed-book exam. No reference materials will be allowed during the exam. Online calculators are available to examinees to assist with calculations. External calculators are not allowed.



# CERTIFICATION SUMMARY

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## Select a Certification

SMRPCO offers certifications for different points in your career. Assess your education, work experience and knowledge to select the SMRPCO certification that is right for you.

## Determine Eligibility

The first step in the certification process is to review all of the eligibility requirements for your selected exam, and ensure you are qualified to sit for the exam before completing an application.

## Complete Your Application and Pay

After you determine that you are eligible to take your selected exam, complete the applicable exam application. Your application will not be accepted until payment is made. Upon completing your application and paying, you will have six months to sit for the exam.

## Schedule Your Exam

The CMRP and CMRT exams are delivered by Pearson VUE, the official computer-based testing provider for SMRPCO. Once SMRPCO processes your application and payment, you will receive an "Authorization to Test" email from Pearson VUE with instructions for how to create a profile with Pearson VUE and schedule your exam. More information about scheduling your exam can be found [here](#).

## Take Your Exam

Candidates have six months from the date of payment to take a SMRPCO exam. You must schedule and sit for your exam within those six months. Those who fail to take the exam within the six-month window must reapply and pay for the exam as new candidates.

Exams may be taken at a Pearson VUE computer-based testing facility. Pearson VUE has over 5,000 testing centers worldwide, including on U.S. military bases. Candidates can locate a testing center online [here](#). SMRPCO exams are delivered via computer at Pearson VUE facilities, and candidates are not required to bring their own.

## Get Your Results

Exam results are available immediately after submitting the exam. Candidates that do not pass the exam are eligible to retake the exam after six months. To retake the exam, a candidate must reapply and pay as a new candidate.

## Maintain Your Certification

After successfully passing a SMRPCO exam, candidates are responsible for maintaining their certification. Both the CMRP and CMRT exam are active for three years. At the end of the three-year cycle, certificants are required to submit a recertification application detailing their continuing education and to pay a recertification renewal fee to maintain a SMRPCO certification. More information on the recertification process is available [here](#).





# CERTIFICATION REQUIREMENTS

## EXAM ELIGIBILITY

There are no educational experiences or requirements to sit for the CMRP or CMRT exam. In order to take the CMRP or CMRT exam, a candidate must:

- 1. Complete the CMRP or CMRT application, which is available at [www.smrp.org](http://www.smrp.org)**
- 2. Pay all applicable fees**
- 3. Not have taken the applicable exam within six months**

Candidates who are unable to comply with the eligibility requirements will not be allowed to take a SMRPCO exam. Candidates are permitted to take all SMRPCO exams, so long as all eligibility requirements are met, for as many times as necessary to achieve a passing score.

## Application Process

Eligible individuals who wish to pursue the CMRP or CMRT credential must complete the online application and pay the applicable fees to take the exam.

SMRPCO applications are open, meaning there is no schedule or deadline to apply and pay for an exam.

## Obtaining an Application

The CMRP and CMRT applications are available on the SMRP website and must be completed and submitted online. Paper applications are not available.

### [CMRP Application](#)

### [CMRT Application](#)

## Exam Fees and Payment Methods

Candidates are required to pay the applicable exam fees to complete the exam application. Payment can be made online via major credit cards, by check and through wire transfer. SMRPCO also accepts group payments. For information on how to pay for a group, contact staff at [certify@smrp.org](mailto:certify@smrp.org).

SMRPCO reserves the right to adjust exam fees. When applicable, fees will be updated on the SMRP website and in the most current version of this guide.

## Requests for Special Testing Accommodations

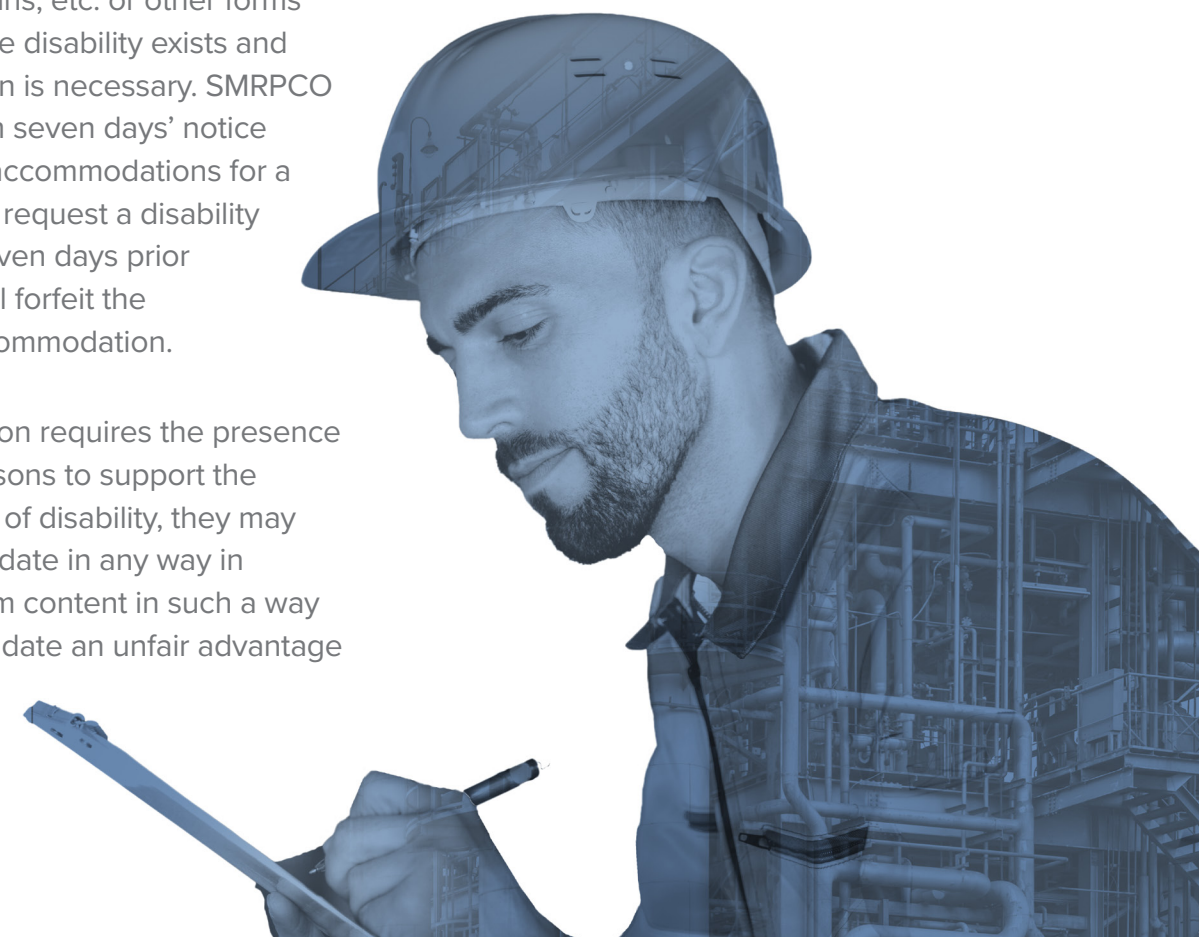
SMRPCO offers accommodations for candidates with disabilities and candidates for whom English is a second language.

If a candidate has a disability that requires accommodation to sit for the exam, the candidate must indicate they have a disability within the applicable certification application and submit a request for accommodation by emailing [certify@smrp.org](mailto:certify@smrp.org). Individuals requesting accommodation must provide proof (signed statements from supervisors, caregivers, physicians, etc. or other forms of evidence) that the disability exists and that accommodation is necessary. SMRPCO requires a minimum seven days' notice to request special accommodations for a disability. Failure to request a disability accommodation seven days prior to an exam date will forfeit the opportunity for accommodation.

If the accommodation requires the presence of one or more persons to support the candidate because of disability, they may not assist the candidate in any way in understanding exam content in such a way as to give the candidate an unfair advantage

over candidates without disabilities. Supporting personnel must agree to SMRPCO's Nondisclosure Agreement and agree to not sit for the exam for five years after the date they assist a candidate.

Candidates, whose primary language is not English, may use a strict translation dictionary developed for common use during a certification exam. Candidates must bring their own dictionary to the testing center or exam venue. Any dictionary that has definitions, any written notes, or additional text will not be allowed. Dictionaries will be inspected by the exam proctor, and those who violate this policy will have the dictionary seized. Candidates who refuse to allow the proctor to inspect the dictionary or bring a dictionary that does not meet SMRPCO guidelines will not be allowed to test with the dictionary.



# CMRP EXAM OUTLINE

The Society for Maintenance and Reliability Professionals (SMRP) has created the Maintenance and Reliability Body of Knowledge. The foundation of the Maintenance and Reliability Body of Knowledge is the five pillars of knowledge: Business and Management, Manufacturing Process Reliability, Equipment Reliability, Organization and Leadership, and Work Management. The Maintenance and Reliability Body of Knowledge was developed by SMRP's Maintenance and Reliability Knowledge Committee using a rigorous development process. The current Maintenance and Reliability Body of Knowledge extends to level 2, the function level. Additional levels are under development and will be published periodically.

## 1.0 Business and Management

This subject area describes the skills used to translate an organization's business goals into appropriate maintenance and reliability goals that support and contribute to the organization's business results.

### 1.1 Create Strategic direction and plan for M&R operations

- Provide vision and direction
- Provide clear and measurable goals

### 1.2 Administer Strategic plan

- Develop support
- Obtain approval and resources
- Implement plans

### 1.3 Measure Performance

- Select key performance indicators
- Track and report

### 1.4 Manage organizational plan

- Develop change management process
- Communicate benefits

### 1.5 Communicate with stakeholders

- Provide management reports
- Inform staff
- Coordinate with operations

### 1.6 Manage environmental-health-safety risk

- Support community EHS goals
- Support security goals
- Conform to applicable regulations
- Provide EHS training

## 2.0 Manufacturing Process Reliability

This subject area relates maintenance and reliability activities to the manufacturing process of the organization to ensure that maintenance and reliability activities improve the manufacturing process.

### 2.1 Understand the applicable processes

- Document process flow
- Understand process parameters
- Understand quality specifications

### 2.2 Apply process improvement techniques

- Identify production losses
- Establish continuous improvement process

### 2.3 Manage effects of change to processes and equipment

- Establish change protocol
- Update documentation
- Update procedures

### 2.4 Maintain processes per applicable standards and regulations

- Understand industry standards
- Understand regulatory requirements
- Ensure compliance

## 3.0 Equipment Reliability

This subject area describes two kinds of activities that apply to the equipment and processes for which the maintenance and reliability professional is accountable. First are those activities used to assess the current capabilities of the equipment and processes in terms of their reliability, availability, maintainability, and criticality. Second are the activities used to select and apply the most appropriate maintenance practices, so that the equipment and processes continue to deliver their intended capabilities in the safest and most cost-effective manner.

### 3.1 Determine equipment reliability expectations

- Identify reliability goals
- Identify process expectations

### 3.2 Evaluate equipment reliability and identify improvement opportunities

- Measure and track performance
- Determine best-demonstrated performance
- Analyze gaps

### 3.3 Establish a strategic plan to assure reliability of existing equipment

- Identify appropriate analysis techniques
- Develop maintenance strategy and tactics

### 3.4 Establish a strategic plan to assure reliability of new equipment

- Establish reliability specifications
- Establish acceptance criteria
- Obtain complete documentation

### 3.5 Cost-justify selected plans for implementation

- Conduct cost-benefit analysis
- Communicate benefits
- Obtain approval

### 3.6 Implement selected plans to assure equipment reliability

- Apply reliability strategies
- Establish organization structure
- Provide resources



### 3.7 Review reliability of equipment and adjust reliability strategy

- Assess key performance indicators
- Analysis deviations
- Identify relevant best practices
- Implement continuous improvement

## 4.0 Organization & Leadership

This subject area describes processes for assuring that the maintenance and reliability staff is the most qualified and best assigned to achieve the maintenance and reliability organization goals.

### 4.1 Determine organizational requirements

- Review strategic plan
- Determine required skills
- Determine required staffing levels

### 4.2 Analyze organizational capability

- Inventory staff skills
- Determine performance gaps

### 4.3 Develop the organization structure

- Establish reporting channels
- Determine roles
- Determine responsibilities
- Manage reorganization

### 4.4 Develop personnel

- Provide training
- Obtain needed expertise
- Delineate career paths

### 4.5 Lead and manage people

- Develop leadership skills
- Assess performance
- Promote a cooperative work environment
- Facilitate communication

## 5.0 Work Management

This subject area focuses on the skills used to get the maintenance and reliability work done. It includes planning and scheduling activities, quality assurance of maintenance activities, stores and inventory management.

### 5.1 Identify, validate, and approve work

- Establish work identification processes
- Select and approve viable work

### 5.2 Prioritize work

- Develop formal prioritizing system
- Implement formal prioritizing system

### 5.3 Plan work

- Develop job package
- Including scope and procedures
- Including materials and tools
- Including testing

### 5.4 Schedule work

- Develop scheduling process
- Produce work schedule
- Balance resources
- Monitor backlog
- Manage break-in work
- Coordinate equipment access

### 5.5 Execute work

- Manage labor
- Manage material and services
- Control productivity
- Ensure EHS compliance

### 5.6 Document work

- Create post-work document process
- Record failure events and failure modes

### 5.7 Analyze work and follow-up

- Compare actual work with plan
- Identify variances

### 5.8 Measure work management performance

- Establish performance indicators
- Report schedule compliance and rework

### 5.9 Plan and execute projects

- Define scope
- Estimate project and life cycle costs
- Apply critical path methods
- Track progress
- Coordinate staffing

### 5.10 Use information technologies effectively

- Leverage capabilities of data historian
- Process control systems
- Condition monitoring software
- EAM,CMMS systems functionality

### 5.11 Manage resources and materials

- Control materials inventory
- Manage spares and equipment
- Establish MRO procurement process
- Manage contractors





# CMRP PRACTICE QUESTIONS

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## 1. Which one of the following is generally true?

- a. Construction contractors are usually equally skilled at performing all maintenance tasks
- b. Maintenance is often reduced through project designs that provide in-place spares for all rotating equipment and heat exchangers
- c. Reliability Centered Maintenance can be applied on capital projects in the pre-construction stage to determine the maintenance plan
- d. Most mechanics can easily alternate between doing capital project work and doing equipment diagnosis and repair work

## 2. What are the three most significant constraints when developing a Maintenance and Reliability organization?

- a. Culture / People / Resources
- b. Budget / Operations / People
- c. Engineering / Human Resources / Budget
- d. Culture / Engineering / Budget

## 3. Weibull (life data) analysis is primarily used for:

- a. Maintainability analysis
- b. Probability of failure determination
- c. Life-cycle cost analysis
- d. On time ratio calculations

## 4. A large manufacturing company installed some asset monitoring devices on some large motors that were deemed critical equipment. The monitoring devices provide engineering with vibration data, acoustic data, as well as operational performance data. What asset management strategy has the company selected for the motors?

- a. OBM (Operational Based Maintenance/CM) (Corrective Maintenance)
- b. PM (Preventive Maintenance/OBM) Operator Based Maintenance)
- c. CBM (Conditioned Based Maintenance)/PDM) (Predictive Maintenance)
- d. CBM (Condition Based Maintenance/CM) (Corrective Maintenance)

## 5. If a machine is run for 500 hours and five failures are observed during this period, what is the Mean Time Between Failure?

- a. 500 hours
- b. 0.01 hours
- c. 2500 hours
- d. 100 hours

## 6. Which of the following most effectively makes up the members of a Manufacturing Team?

- a. Sales/Customer/Production/Supplier/Senior Management
- b. Maintenance/Engineering/Production/Human Resources
- c. Production/Maintenance/Supplier/Engineering
- d. Senior Management/Production/Human Resources

## 7. A skills audit is undertaken to:

- a. Help an organization understand skills in its industry
- b. Help an organization understand skills it requires
- c. Benchmark skills against other companies
- d. Develop employee training plans for the next year

## 8. Of the following, what is the best method for measuring employee skills and training?

- a. Maintain a skills inventory and tracking database
- b. Ask employees to keep a training notebook
- c. Keep records of all formal training courses taken
- d. Have employees complete annual self-evaluations

## 9. When training maintenance workers, it is best to first:

- a. List all the tasks the workers need to perform
- b. Check the budget to set how much to spend per worker
- c. Review the list of classes already taken by the workers
- d. Give classes to all workers on basic skills

**10. What relationship should Maintenance and Reliability Teams have with customers and suppliers for optimum effectiveness?**

- a. Purchasing should be the only communicators with suppliers
- b. Management should be the only communicators with customers and suppliers
- c. Team members should be involved in communicating with customers and suppliers
- d. Sales should be the only department communicating with customers

**11. Which of the following metrics definitions is not accurate?**

- a. Uptime - % of time you run producing quality product at design rate
- b. Schedule compliance - how often mechanics are pulled off their current work to another task
- c. MTBF - a measure or indicator of equipment life expectancy
- d. Backlog - how long it takes to fix broken equipment

**12. Which of the following does not support people development?**

- a. Providing feedback only when asked
- b. Defining result areas, goals, and measurements
- c. Coaching, feedback, and encouragement
- d. Defining training and skills goals

**13. From the following list, which is not a critical structural element of a strategic plan for maintenance and reliability?**

- a. Current levels of performance
- b. Benefits available through implementation
- c. Historical direction of the business
- d. Vision of the future state

**14. Which performance result best shows a maintenance and reliability manager that the scheduled maintenance activities being implemented are effective?**

- a. Hours spent on unscheduled maintenance have decreased
- b. Maintenance cost per unit of production has decreased
- c. Total annual maintenance cost has decreased
- d. Production rate has increased

**15. When the time period between the testing which detects a failure, for failures with significant economic consequences, and when life expectancy is highly variable, a good approach is:**

- a. More frequent periodic predictive testing
- b. Structured preventive maintenance
- c. On-line condition monitoring
- d. Time based rebuild or change out

Answer Key:

1: C; 2: A; 3: B; 4: C, 5:D; 6: C, 7: B, 8: A, 9: A, 10: C, 11: D, 12: A, 13: C, 14: A, 15: C





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