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CMRP CMRP

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Topic Break Down

Topic	No. of Questions
Topic 1, Business and Management	34
Topic 2, Manufacturing Process Reliability	7
Topic 3, Equipment Reliability	60
Topic 4, Organization and Leadership	42
Topic 5, Work Management	34
Total	177

QUESTION NO: 1

Which one of the following metrics definitions is not accurate?

A. Work Order Cycle Time - average number of hours jobs are planned in advance of execution

B. Mean Time To Repair (MTIR) how long it takes to fix broken equipment

C. Estimated Asset Replacement Value per Mechanic - how much equipment value is maintained by each mechanic

D. % Planned Work - the amount of completed work that was planned ahead of time

ANSWER: A

Explanation:

Work Order Cycle Time - average number of hours jobs are planned in advance of execution is the inaccurate definition. Work order cycle time measures the total elapsed time required for a work order to move through its process, normally beginning when the work is requested or created and ending when the work is completed and closed. Depending on the organization's metric specification, it may be reported in calendar days or hours and may distinguish planned from unplanned work, but its purpose is to show the responsiveness and flow efficiency of the maintenance work-management process.

The stated "hours jobs are planned in advance of execution" instead measures planning or scheduling lead time: the time between a job becoming ready/planned and its scheduled or actual execution. That lead-time measure can be valuable for determining whether planners and schedulers have enough advance notice to prepare job plans, materials, permits, and labor, but it does not capture the full request-to-completion duration that defines cycle time. Keeping these measures separate enables maintenance leaders to improve workflow without confusing preparation horizon with end-to-end work-order responsiveness. SMRP identifies work management as a core reliability-management practice; its best-practice resources provide the relevant maintenance-management context: SMRP Best Practices. For an industry description of work-order lifecycle stages and completion/closure, see IBM Maximo work order process.

QUESTION NO: 2

Which of the following tasks should be used to incorporate changes to process and equipment?

1. Use an accepted risk analysis process when a change is made

2. Use a database to record equipment failures

3. Use change procedures and policies to document changes

4. Use cross-functional teams to conduct safety, operability. and maintainability reviews

A. 1, 2, 3

B. 1, 2, 4

C. 1, 3, 4

D. 2, 3, 4

ANSWER: C

Explanation:

1, 3, 4 is correct because effective incorporation of process or equipment changes requires a formal management-of-change approach. Applying an accepted risk-analysis process ensures that hazards and operational consequences are evaluated before the change is implemented. The assessment should consider impacts on personnel safety, process safety, equipment function, operating limits, maintenance requirements, and the integrity of associated systems.

Documenting the proposed change through defined procedures and policies establishes authorization, traceability, accountability, and a reliable record of the technical basis for the decision. Documentation also supports updates to

drawings, operating procedures, maintenance plans, spare-parts requirements, training, and other controlled information that may be affected.

Cross-functional safety, operability, and maintainability reviews bring the necessary operational, engineering, maintenance, reliability, and safety perspectives into the decision. This collaboration helps ensure that a technically feasible change can be safely operated and efficiently maintained throughout its life cycle. These activities align with recognized management-of-change principles in process safety and reliability practice. See the OSHA Process Safety Management standard and the SMRP CMRP certification information.

QUESTION NO: 3

Your plant is in a sold-out position. You just told a visiting senior manager from the corporate office that the reason you place so much emphasis and spend so much money on maintenance planning is that it not only saves money, but it makes money for the business. He asks: How can it make money for the business? Your answer is:

A. it reduces finished product inventory through incasing reliability.

B. it improves quality yield through reduced process disruptions.

C. it enables effective maintenance thereby increasing production capability.

D. it ensures the mechanics are productive all day long.

ANSWER: C

Explanation:

In a sold-out position, customer demand exceeds or fully consumes the plant's available output. Therefore, the principal way maintenance planning makes money is by enabling effective maintenance that increases production capability. Planning ensures that maintenance work is properly scoped, prioritized, sequenced, supplied with the necessary materials, and prepared before equipment is taken out of service. This reduces avoidable delays and improves the quality and timeliness of maintenance execution.

More effective maintenance improves equipment availability and reliability, reducing lost production time from failures, extended outages, and inefficient repair work. The recovered operating time can be converted into additional saleable output when there is sufficient market demand—which the sold-out condition explicitly establishes. In this context, each additional unit produced can contribute revenue and margin, so improved maintenance capability is not merely a cost-control activity; it releases constrained capacity that directly supports business results.

This reasoning aligns with the CMRP focus on linking maintenance and reliability practices to organizational performance, production capacity, and business value. See the SMRP CMRP certification overview and SMRP's Body of Knowledge for the reliability-and-business-performance framework.

QUESTION NO: 4

Which of the following failures, when avoided, is considered a "best practice" for industrial maintenance?

A. Design induced

B. Machine induced

C. Self induced

D. Manufacturer induced

ANSWER: C

Explanation:

Self induced is correct because these failures arise from the way maintenance work is planned, executed, controlled, or documented. Typical contributors include incorrect installation, inadequate lubrication, contamination introduced during

servicing, improper adjustment, incomplete restoration of protective devices, and failure to follow approved procedures. Unlike an unavoidable external event, this category represents a direct opportunity for the maintenance organization to improve reliability through disciplined work management and precision-maintenance practices.

A best-practice maintenance program therefore seeks to prevent self-induced failures by using clear job plans, current procedures, technician training and qualification, appropriate tools, verification of critical work, cleanliness controls, and post-maintenance testing before equipment is returned to service. Capturing failure information and using it in root-cause analysis also helps the organization correct systemic work-process weaknesses rather than repeatedly treating symptoms. This aligns with the CMRP emphasis on effective maintenance and reliability processes, including work management, equipment reliability, and continuous improvement. SMRP describes the certification and its professional body of knowledge at SMRP CMRP Certification; its reliability resources are available through SMRP.

QUESTION NO: 5

What analysis process can best be used to perform a gap analysis?

A. Risk analysis

B. Benchmarking

C. Root cause analysis

D. Fishbone diagram

ANSWER: B

Explanation:

Benchmarking is the best process for performing a gap analysis because it establishes a structured comparison between current maintenance and reliability performance, practices, or capabilities and a defined reference point. That reference may be an internal best-performing site, an industry peer group, a recognized maturity model, or an agreed target state. The comparison makes gaps visible and measurable—for example, differences in planned-work percentage, schedule compliance, preventive-maintenance effectiveness, spare-parts service level, or asset availability. A maintenance organization can then prioritize improvement initiatives according to the size and business impact of each gap, assign accountable owners, and track progress toward the selected benchmark. This supports the CMRP emphasis on using performance measures and continuous-improvement methods to improve the maintenance and reliability system, rather than evaluating an isolated failure or hazard. Effective benchmarking also requires normalizing definitions, scope, and data quality so that comparisons lead to meaningful decisions. The Association for Supply Chain Management describes benchmarking as comparing performance and practices to identify improvement opportunities, while APQC provides widely used benchmarking methodology and measures for process-performance comparisons. See APQC Benchmarking and ASCM Learning and Certifications.

QUESTION NO: 6

When would a strategic plan for Maintenance and Reliability be most appropriately required?

A. Planning and scheduling are not being property implemented at that plant (facility).

B. Improved plant (facility) throughput is required to allow the business to commit to the requirements of a new customer.

C. The markets that the company operates in are changing on a weekly basis.

D. Fixed costs need to be reduced by 20% within the next year.

ANSWER: B

Explanation:

Improved plant (facility) throughput is required to allow the business to commit to the requirements of a new customer is correct because it represents a business-critical, forward-looking need that maintenance and reliability strategy should

directly enable. Accepting a new customer commitment creates a clear requirement for sustained capacity, predictable equipment availability, and controlled operational risk. A Maintenance and Reliability strategic plan translates that business requirement into long-term objectives, such as improving asset reliability, removing capacity-limiting constraints, establishing lifecycle plans, developing workforce capability, and prioritizing capital or reliability-improvement investments. It also provides the governance and performance measures needed to ensure that maintenance activity contributes to the required throughput rather than merely responding to day-to-day equipment issues. This alignment of asset-management decisions with organizational objectives is central to professional maintenance and reliability practice. ISO 55000 describes asset management as coordinated activity used to realize value from assets, with objectives aligned to organizational goals. SMRP likewise identifies business and management as a core maintenance and reliability domain, emphasizing the connection between reliability practices and business results. See ISO 55000:2024 Asset management overview and SMRP Body of Knowledge.

QUESTION NO: 7

The Maintainability of a machine may be measured by:

A. Life Cycle Cost.

B. Machine Maintenance Cost.

C. Failure Rate.

D. Mean Time To Repair (MTTR).

ANSWER: D

Explanation:

Mean Time To Repair (MTTR) is an appropriate measure of maintainability because maintainability describes how quickly and effectively an asset can be restored to its required operating condition after a failure or planned intervention. MTTR measures the average elapsed time needed to perform the repair process, typically including activities such as diagnosing the fault, accessing the equipment, completing the repair or replacement, testing, and returning the machine to service. A lower MTTR generally indicates better maintainability, provided that repairs are completed safely and to the required quality standard.

For CMRP purposes, maintainability is strongly influenced by design and work-management factors that reduce restoration time: good physical access, modular or standardized components, clear procedures, accurate documentation, available spares, suitable tools, and technician capability. Tracking MTTR therefore gives maintenance and reliability teams a practical, repeatable indicator for identifying assets or repair processes that require improvement. It is also commonly used with reliability and availability measures; for example, inherent availability is often expressed using mean time between failures and MTTR. See the ISO 14224 standard page for reliability and maintenance data concepts, and SMRP for the professional body supporting CMRP practice.

QUESTION NO: 8

Which of the following statements about reliability is true?

A. Reliability of a system or equipment can be improved as a result of administration or legislation

B. A reliable system can be designed from unreliable components if enough redundancy is used.

C. Reliability of a system or equipment can be improved as a result of testing.

D. Increasing the amount of maintenance cannot improve reliability above the level established by the design of a system.

ANSWER: B

Explanation:

A reliable system can be designed from unreliable components if enough redundancy is used. is true because reliability is a property of the complete system configuration, not merely a direct copy of the reliability of one component. Redundancy creates alternate success paths: where parallel components perform the same required function, the system fails only when every redundant path fails. For statistically independent components, the reliability of a parallel arrangement is calculated as one minus the product of the individual failure probabilities. Consequently, multiple components with a comparatively modest probability of performing their function can be arranged so that the overall system has a substantially higher probability of successful mission completion. This is a core reliability-engineering design technique, commonly implemented through standby units, duplicate trains, voting logic, or other fault-tolerant architectures. The redundancy must be appropriate to the function, and the analysis must account for dependencies such as common-cause failures, switching reliability, and shared utilities; simply adding duplicate equipment does not automatically guarantee the intended improvement. Nevertheless, when those design considerations are addressed, redundancy is a valid means of achieving a reliable system from less-reliable individual elements. NASA's Reliability and Maintainability (R&M) Program Standard discusses reliability allocation and system design, while the NIST Engineering Statistics Handbook provides reliability-analysis foundations.

QUESTION NO: 9

Which one of the following metrics definitions is not accurate?

A. Work Order Cycle Time - average number of hours jobs are planned in advance of execution

B. Mean TimeTo Repair (MTIR) how long it takes to fix broken equipment

C. Estimated Asset Replacement Value per Mechanic - how much equipment value is maintained by each mechanic

D. % Planned Work - the amount of completed work that was planned ahead of time

ANSWER: A

Explanation:

Work Order Cycle Time - average number of hours jobs are planned in advance of execution is the inaccurate definition because it describes planning lead time rather than work order cycle time. Work order cycle time measures the total elapsed time for a work order to progress through its process, commonly from the time the work is requested or created until it is completed and/or closed. It is a flow-time measure that reveals how efficiently maintenance work moves through identification, approval, planning, scheduling, execution, and closeout. Depending on the organization's formally documented metric specification, the start and end events must be defined consistently so results can be compared over time.

The number of hours that a job is planned before execution instead measures how far in advance planning occurs. That lead-time measure can be useful for evaluating planning discipline and schedule readiness, but it does not indicate the full duration a work order spends in the maintenance workflow. Distinguishing these measures supports sound KPI governance: each metric needs a clear purpose, unambiguous event boundaries, a documented calculation, and consistent use across the site. This aligns with the maintenance and reliability professional practices addressed in the SMRP CMRP certification framework and SMRP's published Best Practices.

QUESTION NO: 10

Which of the following are leading tools or techniques to identify Maintenance and Reliability process improvements?

1. Total Productive Maintenance

2. Reliability Centered Maintenance

3. Historical analysis of spending patterns

4. Process benchmarking with industry leaders

A. 2, 3, 4

B. 1, 3, 4

C. 1, 2, 4

D. 1, 2, 3

ANSWER: C

Explanation:

1, 2, 4 is correct because Total Productive Maintenance, Reliability Centered Maintenance, and process benchmarking are proactive, forward-looking methods that reveal opportunities to improve maintenance and reliability processes. Total Productive Maintenance engages operators and maintenance personnel in preventing losses, improving equipment condition, and continuously eliminating causes of poor performance. Reliability Centered Maintenance provides a structured way to evaluate asset functions, functional failures, failure consequences, and appropriate maintenance policies, enabling teams to improve how work is selected and performed based on risk and reliability needs. Process benchmarking with industry leaders identifies performance and practice gaps by comparing an organization's processes, measures, and methods with proven external practices. This supplies actionable improvement targets and helps establish a desired future state. Together, these methods support systematic improvement in the maintenance and reliability business process rather than merely reporting past results. They align with the CMRP focus on assessing current practices, applying reliability methods, and driving continuous improvement. See the SMRP CMRP certification overview and the ISO 55000 asset-management standard overview for related maintenance, reliability, and continual-improvement principles.

QUESTION NO: 11

The two primary costs in the classical inventory management models that are utilized to determine the Economic Order Quantity (EOQ) are the acquisition cost of inventory and the inventory possession cost. Which of the following best describes the relationship of these costs with the number of inventory turns per year as the number of turns per year increases?

A. acquisition cost increases and inventory possession cost increases

B. inventory possession cost and variable cost increase

C. acquisition cost decreases and inventory possession cost increases

D. acquisition cost increases and inventory possession cost decreases

ANSWER: D

Explanation:

acquisition cost increases and inventory possession cost decreases is correct. In the classical EOQ model, increasing annual inventory turns means the organization is replenishing inventory in smaller quantities and placing orders more frequently. Each replenishment creates an acquisition, ordering, or procurement cost, such as the effort to create and process a purchase order, receive the material, inspect it, and process the supplier invoice. Since more turns require more replenishment events each year, total annual acquisition cost rises.

At the same time, smaller and more frequent replenishments reduce average on-hand inventory. Inventory-possession cost, also called carrying or holding cost, is driven by the quantity and value of material held over time. It includes the cost of capital tied up in stock as well as storage, handling, insurance, deterioration, obsolescence, and related exposure. Therefore, as turns increase, average inventory declines and annual inventory-possession cost decreases. EOQ identifies the order quantity that balances these opposing annual cost trends, helping maintenance and storeroom organizations obtain required materials while avoiding unnecessary inventory investment. See ASCM learning resources and Investopedia's EOQ overview.

QUESTION NO: 12

Which of the following answers is not a critical factor in identifying customer requirements in developing a Maintenance and Reliability Program?

A. Define customer needs

B. Establish standard operating procedures

C. Validate customer requirements

D. Identify and prioritize requirements

ANSWER: B

Explanation:

Establish standard operating procedures is the correct response because it is principally an implementation and control activity, rather than an activity used to discover what customers require from a maintenance and reliability program. Customer-requirements identification occurs at the front end of program development: maintenance and reliability professionals determine who the customers and stakeholders are, elicit their needs and expectations, translate those needs into defined requirements, and confirm that the requirements accurately represent the intended service, risk, cost, quality, availability, and performance outcomes.

Standard operating procedures are valuable documented instructions for executing recurring work consistently after processes, responsibilities, and operating expectations have been established. They support repeatability, training, compliance, and operational discipline. However, their content should be derived from approved requirements and the maintenance strategy, not used as the primary means of identifying those requirements. This distinction aligns with the CMRP emphasis on aligning maintenance and reliability activities with organizational and stakeholder objectives, particularly within the business-and-management domain. See the SMRP CMRP certification overview and SMRP's Body of Knowledge for the competency framework that connects reliability practice to business needs and stakeholder value.

QUESTION NO: 13

Which of the following best measures the effectiveness of the Maintenance and Reliability workforce?

A. The amount of backlog work

B. A set of key performance indicators

C. Trends in the Maintenance and Reliability budget

D. Man-hours of Maintenance and Reliability work performed by production

ANSWER: B

Explanation:

A set of key performance indicators best measures Maintenance and Reliability workforce effectiveness because performance in this field is multidimensional and must be evaluated through a balanced, defined group of measures. A meaningful KPI set connects workforce activity to the outcomes the organization needs: safe execution, dependable assets, effective planning and scheduling, quality of work, efficient use of labor, and progress toward reliability objectives. It permits leaders to establish targets, identify performance trends, investigate gaps, and take corrective action using consistent data rather than relying on one isolated operational number.

In CMRP practice, measures should support the organization's maintenance and reliability strategy and be used as a management system, not merely as a reporting exercise. Suitable indicators may include planned-work percentage, schedule compliance, rework, wrench time, preventive-maintenance compliance, mean time between failures, and maintenance-related availability or cost measures. The appropriate mix depends on the site's objectives and operating context, but using several aligned KPIs provides a more valid view of workforce effectiveness than any individual workload or financial measure. This approach reflects SMRP's emphasis on measuring and managing maintenance and reliability performance through the organization and leadership pillar. See the SMRP CMRP overview and SMRP Body of Knowledge.

QUESTION NO: 14

Select the best measure of maintenance effectiveness from the following list.

A. Return on net assets

B. Total maintenance cost

C. Percent planned maintenance

D. Maintenance cost per unit of production

ANSWER: D

Explanation:

Maintenance cost per unit of production is the best measure because it relates maintenance-resource consumption to the productive output supported by the assets. This normalizes maintenance spending for changes in production volume: a facility may have higher total maintenance expenditure during a period of increased output while still delivering maintenance efficiently and effectively. Expressing cost against a meaningful output unit—such as tonnes, units produced, operating hours, or revenue units where appropriate—helps reveal whether maintenance is sustaining reliable, capable equipment at an economically appropriate cost. It also allows useful comparison across time periods, production lines, and similar sites after accounting for differences in scale and output. CMRP performance measurement emphasizes selecting measures that connect maintenance and reliability activities to organizational results rather than viewing maintenance spending in isolation. A cost-per-output measure makes that connection by showing the maintenance cost required to enable production. The metric should be trended with reliability and quality measures, and its unit definition should remain consistent, so that changes identify genuine performance opportunities. SMRP's professional framework identifies business-and-management performance as a core maintenance and reliability competency: SMRP CMRP certification. For broader guidance on maintenance performance indicators and their use, see ISO 22400 manufacturing operations management KPIs.

QUESTION NO: 15

Which one of the following work order characteristics add the most to the business?

A. Accurate estimate of time and cost

B. Properly categorized - expense versus capital

C. Correct equipment number used

D. All parts ordered and received before work begins

ANSWER: C

Explanation:

Correct equipment number used adds the most business value because it connects every work order to the specific asset on which work was performed. This linkage establishes reliable equipment history, including failure information, maintenance actions, labor, materials, downtime, and cost. A dependable asset history lets the organization analyze recurring problems, identify bad actors, assess maintenance effectiveness, develop appropriate preventive-maintenance strategies, and make informed repair-versus-replace and capital-planning decisions. It also makes maintenance data traceable and usable across the asset life cycle rather than leaving it as isolated transaction data.

In CMRP-aligned practice, quality work-management data supports decisions that improve asset reliability, availability, risk control, and cost performance. The equipment identifier is the essential data anchor for that analysis: without accurate assignment to the maintained asset, even otherwise detailed work-order information cannot be confidently aggregated into equipment-level histories, reliability measures, or total-cost insights. This is why disciplined asset identification and hierarchy are foundational to a useful CMMS/EAM work-order process. SMRP describes CMRP as covering work management and equipment reliability practices, and ISO 55000 frames asset management around realizing value from assets. See the SMRP CMRP overview and ISO 55000 asset-management standard.

QUESTION NO: 16

A motor-driven fan has excessive vibration at one operating speed, but vibration decreases significantly when the fan is operated above or below that speed. The most likely condition is:

A. Resonance

B. Lubricant oxidation

C. Electrical insulation breakdown

D. Hydraulic cavitation

ANSWER: A

Explanation:

Resonance is correct because vibration increases sharply when an excitation frequency, such as running speed or a blade-pass-related frequency, coincides with a natural frequency of the fan, support structure, base, or connected system. At resonance, relatively small forcing inputs can produce large vibration amplitudes.

The appropriate response is to confirm the frequency relationship and evaluate changes that separate the excitation frequency from the natural frequency, such as modifying stiffness, mass, support conditions, or the approved operating-speed range. Increasing balance quality alone may reduce excitation but does not necessarily eliminate a resonance condition. See the ISO 20816 overview for machinery vibration evaluation guidance.

QUESTION NO: 17

Examples of workplace ethics issues include everything except:

A. whistle-blowing.

B. pay raises.

C. conflicts of interest.

D. workplace privacy.

ANSWER: B

Explanation:

pay raises. is the best answer because a raise, by itself, is a normal compensation and performance-management decision rather than a distinct category of workplace ethics issue. In a maintenance and reliability organization, leaders may use pay increases to recognize skills, responsibility, performance, retention needs, or changes in market pay. Those decisions should certainly be administered consistently, transparently, and without discrimination, because fairness in compensation reflects ethical leadership. However, the phrase “pay raises” does not itself identify an ethical dilemma or misconduct issue.

Workplace ethics issues generally concern duties and conduct that can create competing obligations, compromise impartial judgment, affect the treatment of confidential information, or require reporting improper behavior. Ethical standards in professional maintenance practice emphasize integrity, accountability, fairness, and responsible professional conduct. Applying those standards helps managers make compensation decisions fairly, but it does not turn the ordinary existence of a raise into a workplace ethics category. The relevant distinction is between a routine employment action and the ethical principles that must guide how that action is made and communicated. See the SMRP Code of Ethics and the U.S. Department of Labor guidance on employment discrimination.