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QUESTION NO: 1

Choose the correct answer

What is the most significant deficiency impeding widespread use of SysML (without MARTE) in the real-time and embedded domain?

A. a quantifiable notion of time and resources

B. the terminology that is shared with the RT7E domain

C. a means to distinguish embedded from non-embedded systems

D. a means to quantify interactions between a system and its physical environment

ANSWER: A

Explanation:

The correct answer is *a quantifiable notion of time and resources*. Real-time and embedded-system engineering requires models to express and assess measurable timing and execution-platform characteristics: for example, periods, deadlines, execution durations, clock behavior, scheduling assumptions, processor capacity, memory use, communication latency, and energy or power constraints. Although SysML provides broadly useful systems-modeling constructs, it does not by itself define the specialized, standardized semantic framework and annotations needed to represent these quantitative real-time and resource concerns consistently enough for rigorous analysis across tools and teams.

MARTE (Modeling and Analysis of Real-Time and Embedded systems) was created specifically to supply this capability as a UML profile. Its concepts support modeling the relevant time and resource properties of execution platforms and real-time behavior, as well as providing a basis for schedulability, performance, and related analyses. Consequently, without MARTE, the lack of a standardized quantitative treatment of time and resources is the key limitation for broad adoption of SysML in this domain. The OMG describes MARTE as addressing modeling and analysis for real-time and embedded systems; see the OMG MARTE specification overview and the OMG SysML specification overview.

QUESTION NO: 2

Choose the correct answer

A project is developing a distributed information system that will be "open" in the following ways.

(a) The system-level models will be published for the world to see.

(b) Others will be encouraged to submit change requests to the system models. (Changes will be identified by stereotypes.)

(c) Others will be encouraged to develop additional subsystems and plug-ins

The information system is expected to be in use for at least ten years

What is(are) the most important consideration(s) in selecting a SysML modeling tool for this project?

A. the ability to enforce strict compliance with XMI. AP233 and SysML standards

B. compatibility with XMI. the ability to enforce strict compliance with UML4SysML. and the ability to query models based on user-defined criteria

C. compatibility with XMI. the ability to enforce strict compliance with the SysML standard and the ability to query models based on user-
defined criteria

D. compatibility with AP233; the ability to enforce strict compliance with the SysML standard; and the ability to query models based on user-defined criteria

ANSWER: C

Explanation:

“compatibility with XMI. the ability to enforce strict compliance with the SysML standard and the ability to query models based on user-
defined criteria” is correct because it addresses the essential tool capabilities for an open, collaborative model environment that must remain useful over a long operational lifetime. XMI compatibility supports interchange of model content between tools and repositories using a standardized OMG serialization mechanism. This is particularly important when published models, externally supplied updates, and independently developed subsystems must be exchanged without making all participants dependent on one vendor’s proprietary storage format. The OMG XMI specification defines rules for producing and consuming XML documents from MOF-based models; see the OMG XMI specification.

Strict SysML conformance ensures that the shared system models and their stereotype-based extensions are interpreted against the same language definition. SysML is defined as a UML profile and extension for systems engineering, so conformance is central to semantic consistency across collaborating teams and tools. The normative language definition is available from the OMG SysML specification. Finally, user-defined model queries are vital for locating affected elements, identifying applied stereotypes and changes, navigating dependencies, and managing a model that will grow through contributions and plug-ins over many years.

QUESTION NO: 3

Choose the correct answer

Which relationship is likely to be most heavily used during requirements analysis?

A. copy

B. refine

C. satisfy

D. verify

ANSWER: B

Explanation:

refine is correct because requirements analysis is primarily concerned with progressively clarifying requirements and connecting their textual statements to the analysis-model elements that express their meaning in more precise forms. In SysML, a Refine relationship is a dependency indicating that one model element provides a more detailed or constrained specification of another element. It is especially useful when a requirement is elaborated by use cases, activities, state machines, scenarios, blocks, interfaces, or other requirements-model content. This traceability allows a team to retain the original stakeholder requirement while recording the analytical representations that make its intent understandable, assessable, and ready for subsequent architectural and design work. The relationship is intentionally general: its client and supplier may be any appropriate model elements, which makes it broadly applicable throughout early requirements work. The SysML specification defines «refine» as a stereotype of Abstraction used to relate a more detailed model element to an element it refines; see the OMG SysML 1.6 specification. OMG’s SysML resource page also provides the official specification family and supporting materials: OMG SysML.

QUESTION NO: 4 - (SIMULATION)

Choose the correct answer

Which feature needs to be added to the systems development environment to conduct a performance simulation?

ANSWER: Check the explanation for the answer

Explanation:

Correct answer: Add a numerical solver to the systems development environment.

A performance simulation executes/evaluates the mathematical relationships in the system model (for example, constraints, differential equations, rates, capacities, and timing relationships). A **numerical solver** provides the computation capability needed to solve those equations and calculate performance results.

QUESTION NO: 5

Choose the correct answer.

A modeling tool renders ports with a vendor-specific symbol rather than the graphical notation shown in the SysML specification. However, the tool stores the correct SysML port metaclass, properties, and relationships and can exchange those model elements without semantic loss.

Which statement best characterizes the tool deviation?

A. concrete-syntax deviation while preserving abstract-syntax conformance

B. abstract-syntax deviation while preserving concrete-syntax conformance

C. XMI serialization deviation

D. profile-application deviation

ANSWER: A

Explanation:

The tool has a **concrete-syntax deviation while preserving abstract-syntax conformance**. Concrete syntax concerns the visual notation used to present model elements, including symbols and diagram appearance. Abstract syntax concerns the underlying metaclasses, properties, relationships, and constraints that provide the model's meaning. Because the tool preserves the proper port semantics, the deviation is limited to presentation.

A deviation in abstract syntax would affect the represented model concepts or their relationships and could cause semantic or interchange problems. XMI is an interchange mechanism, not a classification of notation deviations, and a profile application does not determine whether a tool's port notation conforms to SysML concrete syntax. See the OMG SysML 1.6 specification.

QUESTION NO: 6

Choose the correct answer.

An engineer defines a block with a flow property *coolant* typed by *Coolant*. The property is intended to be received by the block through a port, but not sent from that port.

Which direction must be specified for the flow property?

A. in

B. inout

C. out

D. provided

ANSWER: A

Explanation:

in is correct because the direction of a flow property is specified relative to the block that owns the property. An `in` flow property identifies an item that can flow into the block through a port typed by the relevant interface or flow specification. An `out` flow property identifies an item that flows from the block, and `inout` permits both directions. See the OMG SysML 1.6 specification.

QUESTION NO: 7

Choose the correct answer

Which option is a measure of model quality?

A. the number of blocks that have been implemented

B. the estimated time to complete the use case model

C. the number of textual requirements approved by the customer

D. the number of actions and activities with no incoming object or control flows

ANSWER: D

Explanation:

The number of actions and activities with no incoming object or control flows is a useful model-quality measure because it can be calculated directly from the structure of an activity model and can reveal elements that may be disconnected from the intended flow of behavior. In SysML, activities describe behavior using UML activity semantics, where control flows govern execution sequencing and object flows carry values or objects between nodes. Examining whether actions and activity-related nodes have appropriate incoming flows helps assess structural completeness and consistency of the behavioral model.

This type of metric is particularly valuable in model reviews and automated validation because it identifies candidates for investigation without relying on project progress, implementation status, or stakeholder approval counts. A reported result does not automatically prove a defect: an action might legitimately be initiated through a permitted modeling construct or represent a deliberate entry point. Nevertheless, a count of elements lacking incoming object or control flows provides an objective, repeatable indicator of potential disconnected behavior and therefore of model quality. SysML adopts UML behavioral modeling foundations, including activities and flows; see the OMG SysML specification and the OMG UML specification.

QUESTION NO: 8

Choose the coned answer

What is one of the best reasons for a modeling Systems Engineer to use OCL?

A. OCL transforms easily into code

B. OCL facilitates understanding by engineers.

C. OCL can express any imaginable constraint

D. OCL allows tor precise specification of constraints based on contents of the model

ANSWER: D

Explanation:

OCL allows tor precise specification of constraints based on contents of the model because the Object Constraint Language is a formal, declarative language designed to supplement UML and SysML-style models with statements that diagrams alone may not express precisely. A systems engineer can use OCL to state invariants that must always hold for model elements, as well as preconditions and postconditions associated with operations. Its expressions can navigate model relationships, select related instances, access property values, and apply collection operations, making it suitable for constraints whose truth depends on the model's structure and contained values. This strengthens model precision by turning an intended rule into an unambiguous expression that can be reviewed and, where tooling supports it, evaluated against a model. The OMG specification describes OCL as a language for specifying constraints and queries over object models, rather than as an implementation language. In systems modeling, this capability supports rigorous specification of consistency rules, permitted relationships, and value restrictions without changing the underlying model notation. See the OMG Object Constraint Language specification and the OMG Systems Modeling Language specification.

QUESTION NO: 9

Choose the coned answer

Which kind of allocation relationship is pivotal m a Y development approach?

A. function To code

B. property to structure

C. requirement to design

D. function to structure

ANSWER: D

Explanation:

function to structure is pivotal in a V-development approach because it establishes the architectural trace from what the system must do to the structural elements that realize those behaviors. On the decomposition and definition side of the V, stakeholder needs and system requirements are refined into functions and logical behavior. Allocating those functions to blocks, components, subsystems, or other structural elements makes the design responsibility explicit. This supports a coherent transition from functional analysis to physical architecture and implementation.

In SysML, an allocation is a general relationship for mapping one model element to another, and it is commonly used to map behavior or functions onto structural elements. That mapping provides essential traceability: engineers can identify the elements responsible for each function, assess the impact of architectural changes, and establish the basis for integration, verification, and validation on the corresponding side of the V. It also helps ensure that the system structure collectively covers the intended functional behavior. See the OMG's SysML 1.6 specification, particularly its definition and usage of allocation, and the INCOSE Systems Engineering Handbook resources for systems-engineering lifecycle and traceability context.

QUESTION NO: 10

Choose the correct answer.

A parametric diagram contains a constraint property typed by a constraint block named *OhmsLaw*. The constraint block has parameters *voltage*, *current*, and *resistance*. The modeler must associate these parameters with value properties of a battery block in the parametric context.

What relationship is used to make these associations?

A. binding connector

B. item flow

C. allocation

D. association

ANSWER: A

Explanation:

A **binding connector** is correct because it binds properties or parameters so that they have the same value in the applicable context. In a parametric diagram, binding connectors commonly connect value properties of the context block to constraint parameters of a constraint property. This establishes how the system values participate in the constraint expressed by the constraint block.

An item flow identifies an item transferred over a connector, and an allocation maps one model element to another. A general association does not have the equality semantics required for parameter binding in a parametric model. See the OMG SysML 1.6 specification.

QUESTION NO: 11

Choose the correct answer

Which OMG specifications does UPDM use at L1?

A. UML and SysML

B. UML. SysML. and BPMN

C. UML, SysML and MARTE

D. UML, SysML and SOAML

ANSWER: A

Explanation:

UML and SysML is correct. At Level 1, UPDM is expressed as a UML profile and uses UML as the underlying language and profiling mechanism. UML supplies the foundational modeling constructs, including classifiers, properties, relationships, constraints, packages, and diagram infrastructure. UPDM also relies on SysML, which is itself defined as a UML profile, for systems-engineering-oriented modeling capabilities that are applicable to enterprise and defense architectures. This combination enables UPDM to represent architecture concepts in a standardized modeling environment while retaining compatibility with SysML-based systems models.

The Level 1 representation is therefore not an independent notation or a direct implementation technology. It maps UPDM's architecture domain concepts onto the UML/SysML metamodeling and profile mechanisms, allowing tools to provide model validation, traceability, and interchange using the relevant OMG standards. The UPDM specification describes the use of UML and SysML in defining its profile-based representation and its relationship to the UPDM domain metamodel. See the OMG UPDM specification at OMG UPDM 2.1 Specification and OMG's specification overview at OMG UPDM Specification Page.

QUESTION NO: 12

Choose the correct answer

In addition to selecting the methodology activities to be performed, what other tailoring does the systems modeling team need to consider when defining the project methodology?

A. which activities will interact with external systems

B. which kind of diagrams will be used to create the domain model

C. which artifacts need to be produced when executing the tailored activities

D. which requirements will be allocated to the specialty engineering activities

ANSWER: C

Explanation:

The correct tailoring consideration is *which artifacts need to be produced when executing the tailored activities*. A project methodology is not defined solely by its sequence of activities; it must also specify the work products that those activities create, update, review, and deliver. In a systems-modeling context, artifacts can include models, model packages, diagrams, requirements views, interface definitions, analysis results, review evidence, and generated reports. Identifying these artifacts establishes what information must be captured and communicated, who will consume it, the expected level of detail, and the criteria by which the work will be assessed.

This decision also makes the methodology practical and governable. Each selected activity should have a clear purpose and produce or refine an identifiable outcome that supports project milestones, technical reviews, traceability, and stakeholder decisions. Artifact selection therefore tailors the methodology to the project's scope, contractual deliverables, risk profile, modeling conventions, and lifecycle needs. SysML provides a standard vocabulary and notation for expressing many of

these model-based artifacts, while systems-engineering practice emphasizes planned technical products and evidence throughout the lifecycle. See the OMG SysML specification and the SEBoK discussion of systems engineering management.