Certified Modeling and Simulation Professional Examination
Sample Questions

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Sample questions are given, one per page. Samples include all topics (but not all subtopics), all difficulty levels (Very easy, Easy, Moderate, Difficult, and Very difficult) and all certification types (Core, User/Manager, Developer/Technical).
Question number
8.10
Question
Which of the following terms is best defined as “the process of determining whether an implemented model is consistent with its specification”?
Correct answer
Verification
Incorrect answer 1
Validation
Incorrect answer 2
Accreditation
Incorrect answer 3
Calibration
Type
Core
Difficulty
Easy
Topic
5.6 Verification, validation, and accreditation
Source
M. D. Petty, “Verification, Validation, and Accreditation”, in J. A. Sokolowski and C. A. Banks,
Modeling and Simulation Fundamentals: Theoretical Underpinnings and Practical Domains,
Page number
330
Question author
M. Petty
Question number 8.18

Question
True or False: Once accredited, a model may be used for any application without further testing.

Correct answer False

Incorrect answer 1 True

Type Core

Difficulty Moderate

Topic 5.6 Verification, validation, and accreditation


Page number 331

Question author M. Petty
In which verification and validation method do subject matter experts in the domain of the model subjectively compare simulation results with their own expert knowledge of the simuland?

Correct answer: Face validation
Incorrect answer 1: Turing test
Incorrect answer 2: Data analysis
Incorrect answer 3: Cause-effect graphing

Type: Developer/Technical
Difficulty: Difficult

Topic: 5.6 Verification, validation, and accreditation

When using ordinary differential equations to model a physical system, the "brute force" approach to improving precision is to ________ at cost of performance.

Correct Answer
Increase the number of iterations

Incorrect Answer
Use higher order derivatives

Incorrect Answer
Use higher order integrators, such as Runge-Kutta integrators

Incorrect Answer
Decrease the number of iterations

Type
Core

Difficulty
Moderate

Topic
4.2 Physics-based modeling

Source

Question author
W. Colley
We model the motion of falling anvil as $h(t) = h_0 - (16 \text{ ft/sec}^2)t^2$, where $t$ is the time since the drop, $h(t)$ is the height as a function of time, and $h_0$ is the original height. If the anvil is dropped from 64 feet, how long does it take to hit the ground?

Correct Answer
2 seconds
Incorrect Answer
4 seconds
Incorrect Answer
1 second
Incorrect Answer
sqrt(2) seconds

Type
Developer/Technical
Difficulty
Easy
Topic
4.2 Physics-based modeling
Source
Question author
W. Colley
In simulating a physical system governed by partial differential equations, _________ can be used to facilitate estimation of derivatives.

Correct Answer
Fourier analysis

Incorrect Answer
The Graham-Schmidt process
Incorrect Answer
The downhill-simplex method
Incorrect Answer
Gauss-Jordan elimination

Type
Developer/Technical

Difficulty
Very difficult

Topic
4.2 Physics-based modeling

Source

Question author
W. Colley
Question number
6.30

Question
Which of these is likely the least practical implementation environment for simulating a physical system governed by ordinary differential equations?

Correct Answer
Discrete event simulation environment (Arena, ProModel, Extend)

Incorrect Answer
Spreadsheet (Excel)

Incorrect Answer
Mathematical development environment (MATLAB, IDL)

Incorrect Answer
General-purpose programming language (C++, Java, FORTRAN)

Type
Core

Difficulty
Moderate

Topic
4.2 Physics-based modeling

Source

Question author
W. Colley
True or False: Grid registration is a technique to reduce the number of range calculations in military simulations.

Correct answer
True
Incorrect answer
False

Type
Developer/Technical

Difficulty
Difficult

Topic
3.1 Combat

Source
Which of the following terms best describes the purpose of sensor footprint exaggeration in military simulations?

Correct answer
It ensures that detection calculations are carried out on all detectable objects between two discrete time steps

Incorrect answer
It is used for marketing brochures

Incorrect answer
It compensates for hindrances to line-of-sight

Incorrect answer
It normalizes sensor footprints

Type
Developer/Technical

Difficulty
Difficult

Topic
3.1 Combat

Source

Page number
357

Question author
S. Barbosa
True or False: When modeling weapons, the standard deviation in the x and y directions are nearly always the same.

Correct answer
False

Incorrect answer
True

Type
Developer/Technical

Difficulty
Moderate

Topic
3.1 Combat

Source

Page number
363

Question author
S. Barbosa
Which of the following terms best describes use of models and simulation by the military, for the purposes of obtaining insight into the cost and performance of military equipment?

Correct answer
Requirements and acquisition

Incorrect answer
Exploration of advanced technologies and concepts

Incorrect answer
Training

Incorrect answer
Geo-navigation

Type
User/Manager

Difficulty
Moderate

Topic
3.1 Combat

Source
R. D. Smith, Military Simulations & Serious Games, Modelbenders Press, Orlando FL, 2009.

Page number
38

Question author
S. Barbosa
Logistics and transportation simulation is beset by all of these problems but ________.

Correct answer
No closed-form solutions are available for related design problems
Incorrect answer
Existing simulation software packages do not support all the necessary model features
Incorrect answer
The industry lacks familiarity with simulation technologies
Incorrect answer
Relevant networks are large and complex with a very large number of entities

Type
User/Manager

Difficulty
Difficult

Topic
3.6 Transportation

Source

Page number
573

Question author
W. Colley
Simulation is likely the best solution available for logistics and transportation problems when considering __________.

Correct answer
Large systems with dynamic arrival and departure times

Incorrect answer
Steady state solutions for a small number of queues

Incorrect answer
Simple heuristics-based systems

Incorrect answer
Models with available closed-form solutions

Type
User/Manager

Difficulty
Easy

Topic
3.6 Transportation

Source
In large logistics systems, movement of raw materials typically occurs between ________.

Correct answer
Suppliers and plants
Incorrect answer
Plants and retailers
Incorrect answer
Warehouses and customers
Incorrect answer
Suppliers and retailers

Type
Core
Difficulty
Moderate
Topic
3.6 Transportation
Source

Page number
577
Question author
W. Colley
Question number
6.416

Question
A common route planning algorithm is __________ algorithm.

Correct answer
The A*

Incorrect answer
Munkres's
Incorrect answer
A least squares
Incorrect answer
Brent's

Type
Developer/Technical

Difficulty
Moderate

Topic
3.6 Transportation

Source

Page number
100–107

Question author
W. Colley
Question number
8.501

Question
Which of the following terms is best defined as “a large simulation system assembled from a set of independent simulations executing on separate computers communicating via a network using a standardized protocol”?

Correct answer
Distributed simulation

Incorrect answer
Monolithic simulation

Incorrect answer
Extended simulation

Incorrect answer
Serial simulation

Type
Core

Difficulty
Easy

Topic
1.2 Categories and paradigms

Source

Page number
191

Question author
M. Petty
Question number
8.502
Question
Which of the following is not an advantage of distributed simulation?
Correct answer
Ease of use; setting up a simulation execution is typically easier
Incorrect answer
Scalability; larger scenarios can be accommodated by adding more nodes to the network
Incorrect answer
Specialization; individual simulation nodes can be optimized for a specific purpose and then combined
Incorrect answer
Geographic distribution; participating simulation nodes need not all be at the same location
Type
Core
Difficulty
Moderate
Topic
1.2 Categories and paradigms
Source
Page number
191
Question author
M. Petty
Question number
8.503

Question
True or False: In a distributed simulation, the networked nodes report the attributes (e.g., location) and actions (e.g., firing a weapon) of the entities they are simulating by exchanging network messages.

Correct answer
True

Incorrect answer
False

Type
Core

Difficulty
Moderate

Topic
5.7 Distributed simulation architecture and protocols

Source

Page number
191

Question author
M. Petty
Question number
8.505
Question
Which of the following is not a distributed simulation network protocol?
Correct answer
XML
Incorrect answer
DIS
Incorrect answer
TENA
Incorrect answer
HLA
Type
Developer/Technical
Difficulty
Easy
Topic
5.7 Distributed simulation architecture and protocols
Source
Page number
191
Question author
M. Petty
Question number
8.526

Question
Why is it important for a semi-automated forces system to generate behavior that is not only plausibly human but consistent with the tactical doctrine of an anticipated enemy?

Correct answer
To provide trainees practice against opponents that use the tactics of the expected adversary

Incorrect answer
To increase the overall believability of the training experience

Incorrect answer
To reduce the complexity of the semi-automated forces system’s behavior generation code

Incorrect answer
To simplify the verification and validation process for the semi-automated forces system

Type
Core

Difficulty
Easy

Topic
5.10 Semi-automated forces/computer generated forces

Source

Page number
197

Question author
M. Petty
True or False: The OneSAF semi-automated forces system software uses a product line architecture that allows the software components of OneSAF to be reusable in different configurations for different applications.

Correct answer
True

Incorrect answer
False

Type
Developer/Technical

Difficulty
Difficult

Topic
5.10 Semi-automated forces/computer generated forces

Source
True or False: Simulation involves generating an artificial history of some system of interest over time and analyzing that artificial history to draw inferences about the system.

Correct answer
True
Incorrect answer
False

Type
Core
Difficulty
Easy

Topic
1.1 Fundamental terms and concepts

Source

Page number
3

Question author
M. Petty
Question

Question
Which of the following is not a use of simulation?

Correct answer
Justify decisions already made based other criteria

Incorrect answer
Describe and analyze the behavior of a system

Incorrect answer
Ask and answer “what it” questions about a system

Incorrect answer
Help in designing new systems

Type
Core

Difficulty
Easy

Topic
1.1 Fundamental terms and concepts

Source
Question
True or False: Only systems that actually exist, as opposed to those that have been planned or designed but not implemented, can be simulated.
Correct answer
False
Incorrect answer
True
Type
Core
Difficulty
Easy
Topic
1.1 Fundamental terms and concepts
Source
Page number
4
Question author
M. Petty
Question number
8.547
Question
Which of the following is not an issue likely to be encountered when conducting a simulation study using discrete-event simulation?
Correct answer
How will the differential equations describing the system be numerically integrated?
Incorrect answer
How are random variates generated if they are not discrete uniformly distributed?
Incorrect answer
How long (in simulated time) should each simulation run (trial) be?
Incorrect answer
How many simulation runs (trials) are required to answer the intended questions?
Type
Developer/Technical
Difficulty
Moderate
Topic
4.6 Discrete event simulation
Source
Page number
4
Question author
M. Petty
Question number
6.801
Question
Test and Evaluation is to occur ________ during the defense acquisition process.
Correct answer
Early and integrated throughout
Incorrect answer
Before milestone A
Incorrect answer
Between milestones B and C
Incorrect answer
Throughout developmental test, fielding, operations and retirement
Type
User/Manager
Difficulty
Moderate
Topic
6.1 Major simulation infrastructures
Source
Page number
12–26
Question author
W. Colley
For which of the following phrases is the complete statement *not* true? Principal problems driving the development of the JMETC infrastructure have been that test resources commonly

Correct answer
Reside on low bandwidth networks
Incorrect answer
Lack a standard capability to communicate among facilities
Incorrect answer
Contain unique software that must be configured for each activity
Incorrect answer
Require long lead times to establish security agreements and protocols

Type
User/Manager
Difficulty
Moderate
Topic
6.1 Major simulation infrastructures
Source
Page number
160
Question author
W. Colley
One of the main problems that results when test resources lack standard capability to collaborate and exchange data is that ________.  

Correct answer  
Effort is duplicated among similar programs

Incorrect answer  
Unique software is needed at each test facility

Incorrect answer  
Physical networks become compromised

Incorrect answer  
Data packets become unsecure
The primary mission of JMETC is to ________.

Correct answer
Provide the DOD with a persistent network linking distributed test facilities

Incorrect answer
Develop a new, more capable version of TENA

Incorrect answer
Guide the DOD in the installation of a nationwide fiber network

Incorrect answer
Standardize methods and metrics for testing military hardware

Type
User/Manager

Difficulty
Moderate

Topic
6.1 Major simulation infrastructures

Source

Page number
161

Question author
W. Colley
Question number
8.13003
Question
Which of the following perceived limitations of modeling and simulation is of greatest concern to managers considering its use for business decision making?
Correct answer
Other techniques (e.g., spreadsheets) provide sufficient capability
Incorrect answer
Decision support models can not be executed in real-time
Incorrect answer
Lack of ability to reuse models for new applications
Incorrect answer
Lack of connectivity from models to information technology systems and databases
Type
User/Manager
Difficulty
Difficult
Topic
7.5
Source
Page
10
Question author
M. Petty
True or False: Because manufacturing applications can be complex with many interdependent parts, modeling and simulation is used extensively to optimize performance.

Correct answer
True
Incorrect answer
False

Type
User/Manager
Difficulty
Very easy
Topic
7.4

Source

Page
12

Question author
M. Petty
Question number
8.13013
Question
True or False: Modelers may choose a modeling method other than the one best suited for the application because of pre-existing familiarity with another method.
Correct answer
True
Incorrect answer
False
Type
User/Manager
Difficulty
Easy
Topic
7.2
Source
Page
17
Question author
M. Petty
Question
8.13014

Question
True or False: When assessing the costs of using modeling and simulation within an organization, time spent by users in operating the model and in training to do so should be omitted.

Correct answer
False

Incorrect answer
True

Type
User/Manager

Difficulty
Easy

Topic
7.2

Source

Page
21

Question author
M. Petty
True or False: When estimating the benefits of introducing modeling and simulation into an organization, managers may wish to consider the long-term benefits of doing so across several potential projects.
 Correct answer
 True
 Incorrect answer
 False
 Type
 User/Manager
 Difficulty
 Very easy
 Topic
 7.4
 Source
Question number
10.46
Question
While many physical problems are typically modeled with second order differential equations, which of the following problems is usually not?
Correct answer
Transverse vibrations of an elastic beam
Incorrect answer
Transient heat conduction in a machine tool associated with a manufacturing process involving an oil quench
Incorrect answer
Propagation of underwater acoustics
Incorrect answer
Dynamic stresses in a high speed turbine blade
Type
Core
Difficulty
Moderate
Topic
8.2 Mathematics
Source
Page number
643
Question author
J. D. Richardson
Question number
10.47

Question
The phrase “linear programming” generally refers to mathematical solution strategies to address problems in ________.

Correct answer
Constrained optimization

Incorrect answer
Linear algebra which arises from various types of numerical analysis

Incorrect answer
Expected algorithmic operation count assessment

Incorrect answer
Linear structural mechanics

Type
Core

Difficulty
Difficult

Topic
8.2 Mathematics

Source

Page number
1088

Question author
J. D. Richardson
All of the following physical phenomena are modeled using potential theory except ________.

Correct answer
Flexure of elastic plates under transverse loading

Incorrect answer
Irrotational incompressible fluid flow

Incorrect answer
Steady state heat conduction in a homogeneous isotropic media without generation

Incorrect answer
Electrostatic fields in the absence of a charge distribution

Type
Core

Difficulty
Moderate

Topic
8.2 Mathematical

Source
Question number
8.301
Question
Which of the following is not part of the definition of acquisition in defense applications?
Correct answer
Employing new systems during combat operations
Incorrect answer
Developing concepts for new systems
Incorrect answer
Assessing the effectiveness of new systems in the field
Incorrect answer
Designing and manufacturing new systems
Type
User/Manager
Difficulty
Very easy
Topic
2.4 Acquisition
Source
Page number
12
Question author
M. Petty
Question number
8.302
Question
True or False: Modeling and simulation can be used in the acquisition process to explore a new or proposed system virtually before expensive hardware and software programs are created.
Correct answer
True
Incorrect answer
False
Type
User/Manager
Difficulty
Very easy
Topic
2.4 Acquisition
Source
Page number
13
Question author
M. Petty
Which of the following is *not* a way modeling and simulation can be used in the acquisition process?

**Correct answer**
Preparing system users for specific operational tasks

**Incorrect answer**
Aiding in concept selection
Performing detailed design and specification
Verifying of complex systems

**Type**
User/Manager

**Difficulty**
Easy

**Topic**
2.4 Acquisition

**Source**