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عدد صفحات النموذج: 1		

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Internal Examiner: Dr. Raad Alwan
Semester one of academic year: 2019-2020
Department of CS
Course Name: Modeling and Simulation
Date: 13/11/2019
Time: 50 min.
First Exam

Information for Candidates:

*1. This examination paper contains ... questions, totaling **....** marks.*
2. The marks for parts of questions are shown in round brackets.

Advice to Candidates

1. You should attempt all questions.
2. You should write your answers clearly.

Objective: This part aims to show student capability to answer the understanding knowledge.

Q1/ (7-marks): Answer the following MCQs:

1. Simulation:
   a) Does not guarantee optimality.
   b) Is flexible and does not require the assumptions of theoretical models.
   c) Allows testing of the system without affect in the real system.
   d) All of the alternatives are correct.

2. A simulation model used in situations where the state of the system at one point in time does not affect the state of the system at future points in time is called a:
   a) Dynamic simulation model.
   b) Static simulation model.
   c) Unsteady state simulation model.
   d) Discrete event simulation model.

3. When events occur at discrete points in time:
   a) A simulation clock is required.
   b) The simulation advances to the next event.
   c) The model is a discrete event simulation.
   d) All of the alternatives are correct.

4. The process of determining that the computer procedure that performs the simulation calculations is logically correct is called:
   a) Implementation.
   b) Validation.
   c) Verification.
   d) Repetition.

5. Numerical values that appear in the mathematical relationships of a model and are considered known and remain constant over all trials of a simulation are:
   a) Parameters.
   b) Probabilistic input.

c) Controllable input.
d) Events.

6. The first step in simulation is to:
a) Set up possible courses of action for testing.
b) Construct a numerical model.
c) Validate the model.
d) Define the problem.

7 . Which of the following statements is INCORRECT regarding the advantages of simulation?
a) Simulation is relatively easy to explain and understand.
b) Simulation guarantees' an optimal solution.
c) Simulation models are flexible.
d) Simulation model provides a convenient experimental laboratory for the real system.

Q2 (3 marks) Answer the following:

1- What are the properties of strength model based on theory?

The strength of theory depends on:

- **Precision.**
- **Simplicity.**
- **Domain of application**
- **Easy to use**
- **Provability**
- **Degree of surprise.**
- **Depth of our understanding**

2- We apply model verification to ensure that: **The model is consistence, The model is programmed correctly, The algorithms have been implemented properly, and the model does not contain errors, oversights, or bugs.**

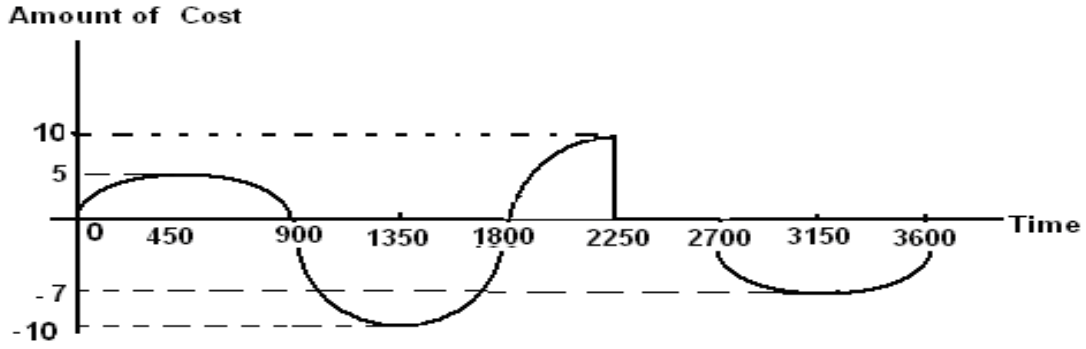
3- We apply model validation to ensure that **the model meets its intended requirements in terms of the methods employed and the results obtained.**

Familiar Part:

Objective: This part aims to show student capability to find solution of the problem (problem solving approach).

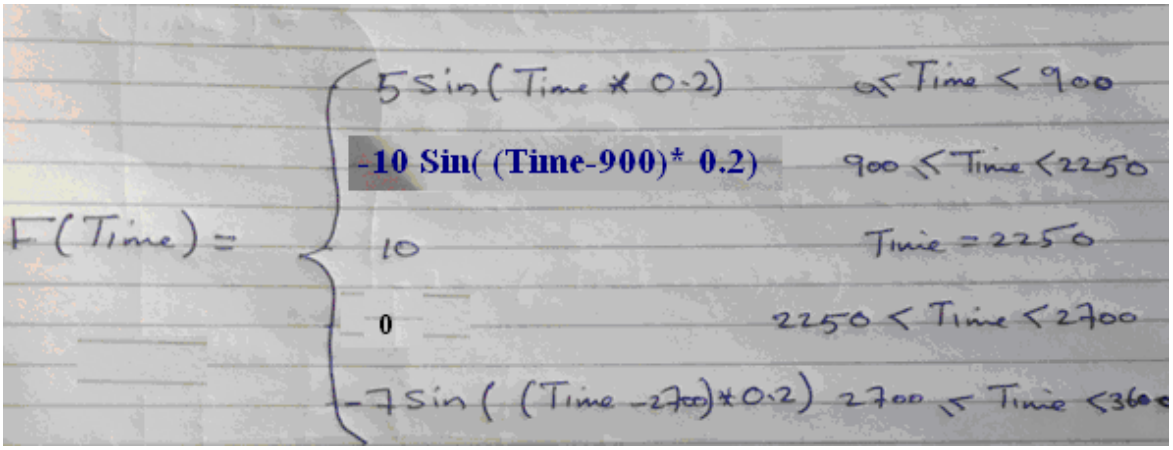
Q3(10 marks)

Assume that we have the following continuous function for the commercial project.



Answer the following *(4marks for each*)

1- Build mathematical model to describe and imitate the above system behavior.



2- Write suitable algorithm to check validation of the model.

Induction Algorithm

Step1: Find massing data from observations.
Step2: Formulate hypothesis to fit all data (from particular to general).
Step3: if all data are matching with model based on hypothesis then
Model is valid
Otherwise
Model is invalid

3- Apply the algorithm that was selected in point 2 on specific data.

Validation:
Select mass of data (900, 1350, 3150,….)
Using induction algorithm to prove the model validation for three of observation

- **for time=900 then F(900)=-10*sin((900-900)*0.2)= 0**

Then it is matching with the real system

- **for time=1350 then F(1350)=-10*sin((1350-900)*0.2)= -10**

Then it is matching with the real system

- **for time =3150 then F(3150)=-7*sin((3150-2700)*0.2)=-7**

Then it is matching with the real system