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MCA – 402

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1473 Roll No.

MCA

(SEM IV) EVEN SEMESTER THEORY EXAMINATION, 2009-2010

MODELING AND SIMULATION

Time : 3 Hours *Total Marks : 100*

Note : *(i) Attempt **ALL** the questions.*

(ii) All questions carry equal marks.

1. Attempt **any two** of the following : **(2x10=20)**

(a) Write a critical note on the nature, applications and limitations of simulation.

(b) Discuss full corporate model in detail.

(c) Name three of the principal entities, attributes and activities to be considered if the operation of the following is to be carried out.

Computer centre, bank, reservation counter, hospital emergency room.

2. Attempt **any two** of the following : **(2x10=20)**

(a) Discuss the concepts and methodology of Monte Carlo simulation.

(b) Consider the following mathematical model of the national economy. Let

C be consumption

I be investment

T be taxes

G be govt. expenditure

Y be national income

$C = 40 + 0.8\ (Y - T)$

$I = 4 + 0.2\ Y$

$T = 0.3\ Y$

$Y = C + I + G$

All quantities are in billions of rupees. Make the above model dynamic by lagging some of the variables. List the assumptions made. Explain the observations of the dynamic model made by you.

(c) Give an example for each of the following systems and point out system elements, system boundary and system environment.

(i) Man - machine system

(ii) Traffic control system

(iii) Engineering system

3. Attempt **any two** of the following : **(2x10=20)**

(a) Explain what is meant by model validation. How model is validated in practice ?

(b) Formulate a simple model to fore cast the growth in the usage of the computing facilities. Given that

$Y(t)$ = number of computer users at time t

C = potential number of computer users, a constant

$X(t)$ = number of computer plotter users at time t

$Y(0) = 1000$

$X(0) = 250$

The model should predict the number of computer and plotter users at time t. Justify the assumptions, if any and interpret the result.

(c) Explain the following :

(i) Real time simulation

(ii) Hybrid simulation

4. Attempt **any two** of the following : **(2x10=20)**

(a) State the properties of random numbers. Explain with example how random numbers are tested.

(b) Show that the activities in a project network can be ordered topologically if and only if the network contains no cycles.

(c) Discuss in detail how inventory system can be simulated.

5. Attempt **any two** parts of the following : **(2x10=20)**

(a) Compare between continuous simulation language and discrete simulation language.

(b) Discuss exponential growth model with an example.

(c) How feed back in socio-economic system is carried out ?

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