SIMULATION AND MODELING [CT 753] - SYLLABUS IV/II

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Lecture : 3 Year : IV

Tutorial : 1 Part : II

Practical : 1.5

Course objectives:

To provide the knowledge of discrete and continuous system, random numbers generation, queuing system and computer system simulation.

1. Introduction to Simulation (4 hours)

1.1 system, model and simulation
1.2 Discrete and continuous systems
1.3 Model of a system
1.4 Types of models
1.5 Steps in simulation study
1.6 Model development life cycle
1.7 Advantage and disadvantage of simulation
1.8 Limitations of the simulation techniques
1.9 Areas of application

2. Physical and Mathematical models (4 hours)

2.1 Static physical model
2.2 Dynamic physical model
2.3 Static mathematical models
2.4 Dynamic mathematical models

3. Continuous system simulation (5 hours)

3.1 Differential and partial differential equations
3.2 Continuous system models

3.3 Analog computer
3.4 Analog Methods
3.5 Hybrid simulation
3.6 Digital-Analog simulators
3.7 Continuous System simulation languages(CSSLs)
3.8 Feedback systems

4. Queuing system (6 hours)

4.1 Elements of queuing system
4.2 Characteristics of queuing systems
4.3 Model of queuing system
4.4 Types of queuing system
4.5 Queuing notation
4.6 Measurement of system performance
4.7 Network of queues
4.8 Applications of queuing system

5. Markov chains (3 hours)

5.1 Key features of Markov chains
5.2 Markov process with example
5.3 Application of Markov chain

6. Random Number (10 hours)

6.1 Properties of Random Numbers
6.2 Generation of Pseudo-Random numbers
6.3 Random Number generation methods
6.4 Test for random numbers
6.5 Generating discrete distribution
6.6 Inversion, rejection , composition and Convolution

7. Verification and validation of simulation models (3 hours)

7.1 Verification and validation
7.2 Verification of simulation models
7.3 Calibration and validation of models

8. Analysis of simulation output (4 hours)

8.1 Estimation methods
8.2 Simulation run statistics
8.3 Replication of runs
8.4 Elimination of Initial bias

9. Simulation software (3 hours)

9.1 simulation in Java
9.2 simulation in GPSS
9.3 Simulation in SSF
9.4 Other simulation software

10. Simulation of computer systems (3 hours)

10.1 Simulation tools
10.2 High Level computer –system simulation
10.3 CPU simulation
10.4 Memory Simulation

Practicals:

1. Simulation of continuous system
2. Simulation of the R-C amplifier circuit
3. Generation of Random number
4. Simulation mass spring damper system
5. Simulation of National econometric system

References:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, Devid M. Nicol, P. Shahabudeen:Discrete-Event system simulation
2. Geoffrey Gordon: System Simulation
3. A.M. Law and W.D. Kelton: Simulation and Modeling and analysis
4. R. Y. Rubinstein, B. Melamed: Modern Simulation and Modeling
5. S. Shakya: Lab Manual on Simulation and modeling

Evaluation Scheme:

The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	**Hours**	**Marks Distribution ***
1	4	8
2	4	6
3	5	10
4	6	10
5	3	6
6	10	18
7	3	5
8	4	5
9	3	6
10	3	6
Total	45	80

*There may be minor variation in marks distribution.