

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPT./CENTRE: **Electronics and Computer Engineering**

1. Subject Code: **EC – 501N** Course Title: **Modeling and Simulation**

2. Contact Hours: **L: 3 T: 0 P: 0**

3. Examination Duration (Hrs.): **Theory**

0	3
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Practical

0	0
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4. Relative Weight: **CWS**

15

PRS

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MTE

35

ETE

50

PRE

00

5. Credits:

0	3
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6. Semester:

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Autumn Spring Both

7. Pre-requisite: **EC - 101A / EC - 101B or equivalent**

8. Subject Area: **DEC**

9. Objective: To acquaint the students to simulation techniques of discrete event systems.

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	Introduction: Systems, models, discrete event simulation and continuous simulation.	2
2.	Discrete Event Simulation: Time-advance mechanisms, event modeling of discrete dynamic systems, single-server single queue model, event graphs, Monte Carlo simulation.	6
3.	GPSS: Model structure, entities and transactions, blocks in GPSS, process oriented programming, user defined functions, SNA, logic switches, save locations, user chains, tabulation of result, programming examples.	6
4.	Random Number Generation: Congruence generators, long period generators, statistical quality measures of generators, uniformity and independence testing, chi-square and other hypotheses testing, runs testing.	6
5.	Random Variate Generation: Location, scale and shape parameters, discrete and continuous probability distributions; Inverse transform method, composition and acceptance-rejection methods, efficiency and quality measures of generators; Selection of distribution for a random source, fitting distributions to data, constructing empirical distributions from data.	10
6.	Queuing Models: Little's theorem, analytical results for M/M/1, M/M/1/N, M/M/c, M/G/1 and other queuing models.	6

7.	Network Simulation: SimEvent tool box in MATLAB, general features of network simulation packages, case study of OMNET++.	6
Total		42

11. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1.	Karian, Z.A. and Dudewicz, E.J., "Modern Statistical Systems and GPSS Simulation", 2 nd Ed., CRC Press.	1999
2.	Banks, J., Carson, L.S., Nelson, B.L. and Nicol, D.M., "Discrete Event System Simulation", 3 rd Ed., Pearson Education.	2002
3.	Law, A.M. and Kelton, W.D., "Simulation, Modeling and Analysis", 3 rd Ed., Tata McGraw-Hill.	2003