

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC362	Modelling & Simulation of Communication Systems	3-0-0-3	2016
Prerequisite: EC301 Digital Signal Processing			
Course objectives: <ul style="list-style-type: none">To impart the basic concepts of modeling and simulation of Communication SystemsTo study and evaluate the behavior and performance of the systems.			
Syllabus: Simulation and Modelling Methodology, Review of Random Processes, Random Number generation, Modelling of Transmitter and Receiver subsystems, Communication channels and models, Estimation of parameters in simulation, Estimation of performance measures from simulation, Analysis of simulation results.			
Expected outcome: The students will be able to apply modeling and computational techniques to problems in the communication field			
Text Books: 1. M.C. Jeruchim, Philip Balaban , K.Sam Shanmugam, Simulation of communication systems, Kluwer Academic/Plenum Press, New York, 2000 2. Raj Jain. The Art of Computer Systems Performance Analysis, John Wiley and Sons, 1991 (Chapter 25)			
Course Plan			
Module	Course content	Hours	End Sem. Exam Marks
I	Simulation and Modelling Methodology: Review of Random Processes, Univariate and multivariate models, Transformation of random variables	3	15
	Bounds and approximations, Random process models, Markov and ARMA Sequences, Poisson Process, Gaussian Process	3	
	Random Number Generation, Generation of Random sequences	1	
	Testing Random Number Generators	1	
II	Modelling of Transmitter and Receiver subsystems: Information sources	1	15
	Channel coding, Radio frequency and optical modulation	2	
	Demodulation and detection, Filtering	1	
	Multiple Access : Issues in the simulation of Multiple Access	1	
FIRST INTERNAL EXAM			
III	Communication channels and models: Fading and multipath channels, The Almost Free space channel	3	15
	Conducting and Guided wave media	1	
	Finite state channel models, Methodology for simulating Communication systems operating over Fading Channels.	4	
IV	Estimation of parameters in simulation: Quality of an estimator, Estimating the average level of a waveform,	3	15

	Estimating the average power of a waveform, Estimating the power spectral density of a process	2	
	Estimating Delay and Phase.	2	
SECOND INTERNAL EXAM			
V	Estimation of performance measures from simulation: Estimation of SNR	3	20
	Estimating Performance measures for digital systems-The Monte Carlo Method	2	
	Importance sampling method	2	
VI	Analysis of simulation results: Model Verification Techniques, Model Validation Techniques	3	20
	Transient Removal, Terminating Simulations	2	
	Stopping Criteria, Variance Reduction	2	
END SEMESTER EXAM			

Question Paper Pattern (end semester exam)

Maximum marks : 100

Time : 3 hours

The question paper shall consist of three parts. Part A covers modules I and II, Part B covers modules III and IV, and Part C covers modules V and VI. Each part has three questions uniformly covering the two modules and each question can have maximum four subdivisions. In each part, any two questions are to be answered. Mark patterns are as per the syllabus with 30% for theory and 70% for logical/numerical problems, derivation and proof.

