GUJARAT TECHNOLOGICAL UNIVERSITY

INSTRUMENTATION AND CONTROL (APPLIED INSTRUMENTATION) (03)
SYSTEM ENGINEERING
SUBJECT CODE: 3710315
M.E SEMESTER: I

Type of course: Program Elective I

Prerequisite: Understanding of Modeling and simulation of Engineering systems.

Rationale: This course provide system engineering concepts, modeling methodologies and various analysis techniques.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Topics	Teachig Hrs.	Module Weightage
1.	Systems models and their classifications, principles used in modeling of systems of objectives of constructing models.	4	10%
2.	Reduced Order Models, Reduced Order Modeling Problem in time domain and frequency domain, necessity for model reduction, application of reduced order models algebraic reduction methods, different reduction methods in time domain and frequency domain, stable reduction methods, models of discrete systems.	8	20%
3	System simulation, advantages and disadvantage steps in simulation study.	6	10%
4	Probability concepts, sample space, probability distributions, random signals, characterization of random variables, statistical averages of random variables, discrete and continuous random variables, density and distribution functions, properties of cumulative distribution and probability density function, joint distribution functions.	8	20%
5	Stochastic process, classification of random process, response of linear systems to random inputs, auto correlation and cross correlation function, power spectral density.	8	20%
6	Basic principles of system reliability and failures, component reliability and hazard model. Bath tub curve, Series and parallel systems, reliability of complex system.	8	20%

Reference Books:

S.No.	Name of Authors /Books / Publishers
1.	Gordon G., "System Simulation", Prentice Hall of India
2.	Jamshidi M., "Large Scale Systems Modeling and Control ", Series Volume- 9, North Holland NY
3.	Mahmud M. S., Singh M. G., " Large Scale Systems Modelling", Volume -3, Pergamum Press
4.	Peebles Z. P. Jr., "Probability, Random Variables and Random Signal Principles", 4th Edition, Tata McGraw Hill
5.	Papoulis A., " Probability and Statistics", PHI

Course Outcome:

After learning the course, the students should be able to do system modeling, reliability analysis and life cycle design.

List of Experiments:

Student has to prepare various algorithms and programs for system modeling, reliability analysis and life cycle designcovered in this course with any computing tools (MatLab, Scilab, etc...).

Prepare research paper and submit report of various algorithms for system modeling, reliability analysis and life cycle designcovered in this course.

Major Equipment:

Computer Laboratory

List of Open Source Software/learning website:

- Matlab, Scilab
- NPTEL