UNIT 1 INTRODUCTION:
Overview, limitations of deterministic control & processes.

UNIT 2 PROBABILITY & AXIOMS:
Definition, axioms of probability, conditional probability.

UNIT 3 REPEATED TRIALS:
Combined experiments, Bernoulli trials, Asymptotic theorems, Poisson theorem, Baye’s theorem & statistics.

UNIT 4 RANDOM VARIABLES:
Distribution & density functions, conditional distributions, Total probability & Baye’s theorem. Mean and variance, moments, characteristics. Functions, two random variables, moments & conditional statistics.

UNIT 5 STOCHASTIC PROCESSES:
Stationary processes systems with stochastic inputs; Ergodicity correlation and spectra.

TEXT BOOK:

NOTE : Eight questions are to be set - at least one question from each unit. Students have to attempt five questions in all.
UNIT 1. INTRODUCTION:
Fuzzy control from an industrial perspective, knowledge-based control-lers, knowledge representation in KBC’s.

UNIT 2. THE MATHEMATICS OF FUZZY CONTROL:
Vagueness, fuzzy logic versus probability theory, fuzzy sets, their properties & operations on fuzzy sets, fuzzy relations & operations on fuzzy relations, the Extension Principle, Fuzzy propositions, Tile Compositional Rule of Inference, Different implications, Representing a set of rules.

UNIT 3. FKBC DESIGN PARAMETERS:
The PKBC architecture, choice of variables & content of rules, Derivation of rules, choice of membership functions, choice of scaling factors, choice of fuzzification procedure, choice of defuzzification procedure, comparison and evaluation of defuzzification methods.

UNIT 4. NONLINEAR FUZZY CONTROL:
The Control Problem, The FKBC as a Non-Linear Transfer Element, Types of FKBC such as Pill-like FKBC, Sliding Mode FKBC, Sugeno FKBC.

UNIT 5. ADAPTIVE FUZZY CONTROL DESIGN & PERFORMANCE EVALUATION:
Approaches to Design such as membership function tuning using gradient descent, membership function tuning using performance criteria, the self-organizing controller, model based controller.

UNIT 6. STABILITY OF FUZZY CONTROL SYSTEMS:
The State space approach, Stability and robustness Indices, input-output stability, circle criterion, the conicity criterion.

TEXT BOOK:

REFERENCE BOOK:

Note: Eight questions are to be set at least one from each unit. Students have to attempt five questions in all.
IC-410-E  Fuzzy Control Lab

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At least ten experiments based on the syllabus of IC-402-C (Fuzzy Control Systems) be developed at the Institution Level. The students will be required to perform at least eight experiments in the semester.

IC-458-E  Random Processes in Control and Estimation

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Text Books:
1. Stochastic optimal linear estimation and Control: J.S. Meditch
2. Compensator Design for Stochastic Processor: Newton, Kaser and Gould

Note: 8 questions are to be set. Students have to attempt any five Questions.
LC 460-E PARAMETER ESTIMATION AND SYSTEM IDENTIFICATION

L  T  P
4   -   -

Theory : 100
Class work : 50
Total