

IC-402-E**STOCHASTIC PROCESSES**

L T P
3 1 0

CLASS WORK	:	50
EXAM	:	100
TOTAL	:	150
DURATION OF EXAM	:	3 HRS

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:

Probability, Random variables & Stochastic Processes : Athanasios Papoulis; Mc Graw-Hill.

NOTE : Eight questions are to be set - at least one question from each unit. Students have to attempt five questions in all.

IC-404-E

FUZZY CONTROL SYSTEMS

L T P

3 1 -

Theory : 100 Marks

Class Work : 50 Marks

Total : 150 Marks

Duration of exam. : 3 hours

UNIT 1. INTRODUCTION:

Fuzzy control from an industrial perspective, knowledge-based control-ers, 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 fuzjfication procedure, choice of defuz:zjfication procedure, comparison and evaluation of defuz:zjfication 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 EVALUATIO:

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 robust-ness L'l'dices, input-output stability, circle criterion, the conicity criterion.

TEXT BOOK :

1. "An Introduction to Fuzzy Conu'ol" : D.,Driankov, H.Hellendoom & M.Reinfrank.; Narosa

REFERENCE BOOK:

1. "Fuzzy Control Systems" : Abraham Kandel & Gideon Imngholz ; Narosa New Delhi.

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**

L T P
0 0 2

CLASS WORK : 25
EXAM : 25
TOTAL : 50
DURATION OF EXAM : 3 HRS

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**

L T P
4 - -

Theory : 100 marks
Class work : 50 marks
Total : 150 marks
Duration of exam : 3 hours

Introduction to random variables and random processes. Wiener's theory of optimization. Application of Wiener's theory in the compensator design for feedback control systems. Gauss Markov model for vector random processes. Kalman filtering and prediction for discrete time and continuous time systems. Minimum variance control.

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.

IC- 460-E

PARAMETER ESTIMATION AND SYSTEM IDENTIFICATION

L T P
4 - -

Theory : 100
Class work : 50
Total