Sub Code

:

06ES43

IA Marks

:

25

Hrs/ Week

:

04

Exam Hours

:

03

Total Hrs.

:

52

Exam Marks

:

100

PART – A

UNIT 1:

Modeling of Systems: The control system, Mathematical models of physical systems – Introduction, Differential equations of physical systems – Mechanical systems, Friction, Translational systems (Mechanical accelerometer, Levered systems excluded), Rotational systems, Gear trains, Electrical systems, Analogous systems

6 Hours

UNIT 2:

Block diagrams and signal flow graphs: Transfer functions, Block diagram algebra, Signal Flow graphs (State variable formulation excluded),

7 Hours

UNIT 3:

Time Response of feed back control systems: Standard test signals, Unit step response of First and second order systems, Time response specifications, Time response specifications of second order systems, steady – state errors and error constants.

7 Hours

UNIT 4:

Stability analysis: Concepts of stability, Necessary conditions for Stability, Routh- stability criterion, Relative stability analysis; More on the Routh stability criterion

6 Hours

PART – B

UNIT 5:

Root–Locus Techniques: Introduction, The root locus concepts, Construction of root loci.

6 Hours

UNIT 6:

Stability in the frequency domain: Mathematical preliminaries, Nyquist Stability criterion, (Inverse polar plots excluded), Assessment of relative stability using Nyquist criterion, (Systems with transportation lag excluded).

7 Hours

UNIT 7:

Frequency domain analysis: Introduction, Correlation between time and frequency response, Bode plots, All pass and minimum phase systems, Experimental determination of transfer functions, Assessment of relative stability using Bode Plots.

7 Hours

UNIT 8:

Introduction to State variable analysis: Concepts of state, state variable and state models for electrical systems, Solution of state equations.

6 Hours

TEXT BOOK :

1. J. Nagarath and M.Gopal, “Control Systems Engineering”, New Age International (P) Limited, Publishers, Fourth edition – 2005

REFERENCE BOOKS:

1. **"Modern Control Engineering ",** K. Ogata, Pearson Education Asia/ PHI, 4th Edition, 2002.

2. **"Concepts of Control Systems",** P. S. Satyanarayana; Dynaram publishers, Bangalore, 2001

3. **"Control Systems – Principles and Design",** M. Gopal, TMH, 1999

4. **"Feedback control system analysis and synthesis",** J. J. D'Azzo and C. H. Houpis; McGraw Hill, International student Edition.

Question Paper Pattern: Student should answer FIVE full questions out of 8 questions to be set each carrying 20 marks, **selecting at least TWO questions from each part**

COVERAGE IN THE TEXT BOOK:

UNIT 1: 1.1, 2.1, 2.2, 2.7

UNIT 2: 2.4, 2.5, 2.6, 2.7

UNIT 3: 5.1, 5.2, 5.3, 5.4, 5.5

UNIT 4: 6.1, 6.2, 6.4, 6.5, 6.6

UNIT 5: 7.1, 7.2, 7.3

UNIT 6: 9.1, 9.2, 9.3, 9.4,

UNIT 7: 8.1, 8.2, 8.4, 8.5, 8.6

UNIT 8: 12.1, 12.2, 12.3, 12.6