Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Second Year Bachelor of EC Engineering

Subject Code: EEC403- N	Subject Title: CONTROL SYSTEM

Course Objective:

- Understand the basics of open loop and closed loop feedback systems.
- Understand the concept of stability.
- To Understand Root Locus, Bode Plot and Nyquist Plot.

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	Total Marks
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
03	00	02	05	04	03	70	30	20	30	150

Outline of the Course:

Sr. No	Title of the Unit	Hours
1.	Control Systems Introduction	3
2.	Block Diagram Representation and Signal Flow Graphs	10
3.	Time Response Analysis	10
4.	Stability Analysis	4
5.	Root Locus	8
6.	Frequency Domain Analysis	8
7.	State Space Analysis	5
		48

Total hours (Theory): 48

Total hours (Practical): 32

Total hours: 80

Detailed Syllabus:

Unit No	Topics	Lectures (Hours)	Weightage
1.	**Control System Introduction:** Various Control Systems, Comparison Between Closed Loop And Open Loop Control Systems.	**3**	**5%**
2.	**Block Diagram Representation and Signal Flow Graphs:** Basic definitions, advantages and disadvantages of block diagram, Block diagram reduction rules, Examples based on block diagram reduction techniques, Important definitions related to SFG, comparison of block diagram and SFG methods, Mason's gain Formula for SFG, Formation of SFG from equations and electrical networks	**10**	**25%**
3.	**Time Response Analysis:** Transient and steady state response, stability and sensitivity, various test signals, steady state error, First and Second order system analysis, Damping Ratio, Time Domain Specifications.	**10**	**20%**
4.	**Stability Analysis:** Routh's Stability Criterion, Advantages and disadvantages of Routh's Stability Criterion, Hurwitz's criterion.	**4**	**10%**
5.	**Root Locus:** Introduction, General Rules for Constructing Root Loci. Root-locus technique.	**8**	**15%**
6.	**Frequency Domain Analysis:** Bode Plot, Nyquist plot.	**8**	**15%**
7.	**State Space Analysis:** State variables, state model, State variables, state model	**5**	**10%**
	Total	48	100%

Instructional Method and Pedagogy (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weight age should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

Learning Outcomes:

- The student can be acquired the basic knowledge of control system and their applications, The students will be able to effectively solve the problems related to stability and analyze the systems based on the techniques learnt in the course.
- The students will be able to use the MATLAB as a tool for the control system applications.

TEXT BOOKS & REFERENCE BOOKS:

- Feedback Control Systems by Dr. S.D. Bhide, R.A. Barapate, S. Satyanarayan, Tech-Max Publication, Pune.
- Modern Control System Theory – by Dr. M. Gopal, New Age International Publishers, 2nd edition, 1996.
- Control Systems by Ashfaq Hussain, HaroonAshfaq, Dhanpat Rai& Co.
- Design of Feedback Control Systems by Stefani, Shahian, Savant, Hostetter, Oxford University Press
- Linear Control Systems by B.S.Manke, Khanna Publishers
- Modern Control Engineering By Katsuhiko Ogata, 4th Edition, Prentice Hall of India

LIST OF EXPERIMENTS

Sr. No.	Experiment Title
1.	To study Open Loop Control system.
2.	To study feedback control system.
3.	To study different applications of control system.
4.	To study response of Type "0" Control system.
5.	To study response of Type "1" Control system.
6.	To study response of Type "2" Control system.
7.	To study Test Signal Generator.
8.	Introduction to MATLAB/SCILAB Tool.
9.	To study Root Locus using MATLAB/SCILAB/Lab View.
10.	To study Bode Plot using MATLAB/SCILAB/Lab View.
11.	To study Nyquist Plot using MATLAB/SCILAB/Lab View.
12.	Draw chart of any close loop control system.