EE 418 – AUTOMATIC CONTROL SYSTEMS

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2; Lab: 2

TEXT BOOK

Benjamin C.Kuo, "Automaic Control Systems", Prentice Hall, Inc, latest edition.

COURSE DESCRIPTION

Introduction to open loop and closed loop control system. Control system classification. Block diagram. System transfer function and signal flow graph. Standard input signal. Time domain specifications. Modelling of some physical systems. Time response of first and second order systems. Importance of feedback, sensitivity to parameter variations. System stability and effect of disturbance. Error analysis and error constants. Root locus techniques. Frequency domain analysis (Nyquist- Bode) Analog controllers. Controller tuning.

PREREQUISITE:

EE 218 or EE 328

RELATION OF COURSE TO PROGRAM

Required

COURSE INSTRUCTION OUTCOMES

The student will be able to:

- Know stability concept and time domain analysis using time and frequency response
- Apply modelling and analysis of simple physical system are investigated
- Study controller units, their type analysis and tuning

TOPICS COVERED

- Introduction to control system.
- Differential equation of physical systems.
- Block diagram models using MATLAB.
- Signal flow graph models using MATLAB.
- Test input signals.
- Performance of 1st and 2nd order system.
- Effect of 3rd pole and a zero on the 2nd order system.
- Stability concept Routh- Hurwitz stability criterion.
- Root locus techniques.
- Bode plots.
- Nyquist plots.
- Approaches to system design, advantage of feedback.
- Approaches to system design, advantage of feedback.

- Analog controllers.
- Analog controllers (2).

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional component Content			
Math and Basic Sciences	**Engineering Topics**	**General Education**	**Other**
	✓		

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course aspects
A	An ability to apply knowledge of mathematics, science, and engineering	a_1 a_2
B	An ability to design and conduct experiments, analyze and interpret data.	b_1 b_2 b_3 b_4
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability	c_1 c_2 c_3
D	An ability to function on multi-disciplinary teams.	
E	An ability to identify, formulate, and solve engineering problems	e_1 e_2 e_3
F	An understanding of professional and ethical responsibility	
G	An ability to communicate effectively	
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	
I	A recognition of the need for, and an ability to engage in life-long learning.	
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	
k	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	k