EE 311- Fundamentals of Control Engineering

CREDIT HOURS
3 Hours

CONTACT HOURS (Hours/week)
Lecture: 2; Tutorial: 2; Lab: 2

COURSE COORDINATOR
Dr Hassan Ibrahim

TEXT BOOK:
Benjamin C. Kuo, "Automatic Control Systems", Prentice Hall

COURSE DESCRIPTION:
General revision of Laplace transforms, test input signals. Open loop systems and closed loop systems Transfer function and basic system properties. Block diagram reduction techniques. Signal flow graph reduction techniques. Time response of 1st.and 2nd order systems modeling of some physical, electrical, mechanical and thermal systems. Sensitivity of feedback control systems error analysis ,system types and error constants. Concept of stability analysis, Routh-Hurwitz, relative stability concept and effect of poles and zeros. Analysis & simple electromechanical systems Proportional Integral Derivative controller. System response to P, PI and PID.controller tuning technique (Open loop – Closed loop).

PREREQUISITE:
BA 224

RELATION OF COURSE TO PROGRAM:
Required

COURSE INSTRUCTION OUTCOMES:
The student will be able to present and introduce comprehensive definition of terms and mathematical tools used in the study of control systems

TOPICS COVERED:

- Modeling and analysis of mechanical, electrical and electromechanical systems
- Analysis of open/closed loop systems
- Transfer function determination using block diagram reduction and signal flow graph techniques
- System stability, error and type analysis.

- Time response of 1st order and higher order systems. Pole/zero concept and representation. Methods of improving system response.

CONTRIBUTION OF COURSE TO MEET THE REQUIREMSNTS OF CRITERION 5:

Professional Component Content			
Math and Basic Sciences	**Engineering Topics**	**General Education**	**Engineering Design**
	√		

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course Outcomes
a.	An ability to apply knowledge of mathematics, science, and engineering.	√
b.	An ability to design and conduct experiments, analyze and interpret data.	√
c.	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	
d.	An ability to function on multi-disciplinary teams.	
e.	An ability to identify, formulate, and solve engineering problems.	√
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 societal 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.	√