Associate Degree Program

Specialty	Industrial Control Technology
Course Number	020301231
Course Title	Electrical Drive Systems
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

Definition and structure of electric drive system. Industrial loads. Static characteristics of loads and motors. Equation of motion. Equivalent electric drive system. Transient operations: starting, reverse, braking. Power and control circuits of transient operations using time principle. Methods of speed control. Introduction to semiconductor electric drives.

Course Obje

Upon the completion of the course, the student will be able to:

1. Understand the basic components of an electric drive system.
2. Understand and design various speed controls, braking and holding techniques for electric motors.
3. Understand and design a complete electric drives system for industrial applications.
4. Enable students to carry out a final project on an electric drives system for industrial applications.
5. Identify, select and use components of electrical drives.
6. Identify DC and AC drives characteristics.
7. Control motor speed in electrical drives systems.
8. Use servo drive systems.
9. Construct starting, stopping and reversing systems using timers, relays, contactors and switches.

Detailed Course Description:

Unit number	Unite name	Unite content	Time Needed
1.	**Electrical drive systems. Definition, functions and application, classification. Block-diagram and basic components. Specifications**		
2.	**Electrical drives characteristics. Static and dynamic characteristics of DC and AC drives**		
3	**Starting, braking and reversing of electrical drives. Methods of manual and automatic starting, braking and reversing of DC and AC drives. Static and dynamic characteristics**		
4	**Speed control in DC and AC drives systems. Methods of speed control. Resistance speed control. Voltage variation speed control. Flux speed control. Frequency speed control**		
5	**Power and control circuits based on time principle.**		
8	**Introduction to semiconductor electric drives: Chopper and controlled-rectifier-DC Drives, Inverter-controlled AC drives.**		

Text Books & References:

Textbook:
1. Textbook: Fundamentals of Electric Drives, Mohamed A. El-Sharkawi, Brooks/Cole Pub, 2000.

References:
1. P.C. Sen, Thyristor DC drives, Krieger Pub. C, New York, 2005.
2. D.K. Anand, Introduction to control systems, New-York, Pergamon Press, 1988.
3. M.H. Rashid, Power electronics, Prentice-Hall, USA, 1988.
4. S.B. Dewan, Power semiconductor drives, John Wiley and Sons, New York, 1988.
5. M.M. Chilikin, electric drive, Moscow, 1981.

Associate Degree Program

Specialty	**Industrial Control Technology**
Course Number	020301232
Course Title	**Electrical Drive Systems Lab**
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

❖ Investigation of torque/speed characteristics of drive systems. Automatic start, stop and reverse of drive systems. Speed control. Effect of feedback on torque/ speed characteristics. Servo drives

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Identify, select and use components of electrical drives.
2. Identify DC and AC drives characteristics.
3. Control motor speed in electrical drives systems.
4. Implement open-loop and closed-loop control in electrical drives systems.
5. Use servo drive systems.
6. Construct starting, stopping and reversing systems using timers, relays, contactors and switches.
7. Program PLCs to control electrical drive systems

Detailed Course Description:

Lab. NO.	Content	Notes	Time Needed
1.	**Speed control and characteristics of DC drives**		(2 weeks)
2.	**Speed control and characteristics of AC drives**		(2 weeks)
3	**DC drives starting, braking and reversing**		(2 weeks)
4	**AC drives starting, braking and reversing**		(2 weeks)
5	**Closed-loop drives systems**		(2 week)
6	**Servo drive systems**		(2 weeks)
7	**Semiconductor drive systems**		(2 weeks)

Text Books & References:
Instructional Lab. Sheets