

COURSE TITLE : ELECTRIC DRIVES AND CONTROLS.
COURSE CODE : 6034
COURSE CATEGORY : E
PERIODS/WEEK : 4
PERIODS/SEMESTER : 60
CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Basic Concepts and Selection of Electric Drives	15
2	A C Drives	15
3	D C Drives	15
4	Industrial Application of Drives	15
Total		60

Course Outcome:

Sl.	Sub	On completion of this course the student will be able:
1	1	To understand the basic concepts of drives.
	2	To understand about the selection and rating of a motor for a particular drive.
2	1	To comprehend the characteristics of drives.
	2	To understand the control and application of drives.
3	1	To know the basic characteristics of DC motors
	2	To comprehend the types of DC drives and its speed control.
4	1	To understand the industrial application of electric drives in particular field

Specific Outcome:

MODULE I Basic Concepts and Selection of Electric Drives

- 1.1.1 To plot the block diagram of electric drive system.
- 1.1.2 To describe the various components of electric drives.

- 1.1.3 To compare electric drives and mechanical drives.
- 1.1.4 To discriminate the different factors for the choice of electric drives.
- 1.1.5 To describe the classification of electric drives with specific application.
- 1.1.6 To describe the advantages of electric drives.
- 1.1.7 To describe factors affecting the size and rating of motor for a particular application.
- 1.1.8 To understand the status of electric drives.

- 1.2.1 To determine the power rating motor for continuous operation at constant speed drives like linear motion, lifts, pumps and fans.

MODULE II A C Drives

- 2.1.1 To analyze the performance characteristics of the three phase induction motors.
- 2.1.2 To describe the different methods of starting of three phase induction motors.
- 2.1.3 To describe the different methods of braking of induction motors.
- 2.1.4 To categorize different methods of speed control of three phase induction motors.

- 2.2.1 To describe speed control by voltage controllers.
- 2.2.2 To describe variable frequency control from voltage sources.
- 2.2.3 To describe variable frequency control from current sources.
- 2.2.4 To discriminate current source inverter and voltage source inverter drives.
- 2.2.5 To describe speed control by voltage source inverter.
- 2.2.6 To describe speed control by cycloconverter.
- 2.2.7 To describe speed control of single phase induction motors by voltage controllers.
- 2.2.8 To describe speed control of synchronous motor from variable frequency.
- 2.2.9 To analyze the operation of self controlled synchronous motor drive.
- 2.2.10 To describe the permanent magnet synchronous motor drives.

MODULE III D C Drives

- 3.1.1 To analyze the basic characteristics of various types of DC motors.
- 3.1.2 To describe the different methods of starting of DC motors.
- 3.1.3 To describe the different methods of braking of DC motors.

- 3.2.1 To categorize different methods of speed control of DC motors.
- 3.2.2 To describe speed control by armature voltage control and flux control.
- 3.2.3 To describe speed control by transformer and uncontrolled rectifier fed DC drives.
- 3.2.4 To describe speed control by controlled rectifier fed DC drives.
- 3.2.5 To describe chopper controlled DC drives.
- 3.2.6 To analyze the conventional and DC traction drives.
- 3.2.7 To analyze the operation of DC traction using chopper controlled DC motor drives.

MODULE IV Industrial Application of Drives

- 4.1.1 To describe the working of;
 - a) Solar powered pump drives
 - b) Battery powered vehicle drives
- 4.1.2 To describe the electric drives in;

- a) Steel mills.
- b) Paper mill.
- c) Cement mills.
- d) Textile mills.
- e) Sugar mills.
- f) Petrochemical industry.
- g) Coal mining.

CONTENTS

MODULE I

Electric drive – block diagram - explanation of each block - electric drive and mechanical drive – comparison. Factors for the choice of electric drives. Advantages. Classification. Size and rating of motors - determination of rating of motor – linear motion-lifts-pumps-and fans.

MODULE II

Performance characteristics of 3 phase induction motors-starting – braking. Speed control-voltage controllers-variable frequency from voltage source-current sources - cyclo converter - current source and voltage source- inverter fed drive- Comparison. Speed control - single phase induction motor by voltage controllers - synchronous motor from variable frequency – self controlled synchronous motor drive-permanent magnet synchronous motor drive.

MODULE III

Performance characteristics of DC motors-starting –braking .speed control. Uncontrolled rectifier fed drive- controlled rectifier fed drive - chopper controlled DC motor-DC traction drive - Chopper controlled traction drive.

MODULE IV

Solar powered pump drive - battery powered vehicle drive - Selection of drives in – steel mills - paper mills - cement mills - textile mills-sugar mills - petrochemical industry – coal mining.\

TEXT BOOKS

1. Gopal K Dubbey. Fundamentals of electric drives: Narosa publishing house
2. S K Pillai. A first course on electrical Drives: Wiley Eastern limited