Department of Electrical and Electronics Engineering

COURSE MODULES OF THE SUBJECT TAUGHT FOR THE SESSION AUG-DEC 2025-26

Course Syllabi with CO's

Academic Year: 2025-26

Department: Electrical & Electronics Engineering

Course Code	Course Title	Core/Elective	Pre requisite	Number of Lecture Hours/Week			Total Hrs/ Sessions
				L	T	P	
BEE702	Industrial Drives and Applications	Core	Course knowledge of Electric Motors, Power Electronics	3	-	-	40

Course Objectives:

- To define electric drive, its parts, advantages and explain choice of electric drive.
- To explain dynamics and modes of operation of electric drives.
- To explain selection of motor power ratings and control of dc motor using rectifiers.
- To analyze the performance of induction motor drives under different conditions.
- To explain the control of induction motor, synchronous motor and stepper motor drives.
- To discuss typical applications electrical drives in the industry

Topics Covered as per Syllabus

Module-1	**Teaching Hours**
Electrical Drives: Electrical Drives, Advantages of Electrical Drives. Parts of Electrical Drives, Choice of Electrical Drives, Status of dc and ac Drives. **Dynamics of Electrical Drives:** Fundamental Torque Equations, Speed Torque Conventions and Multi-quadrant Operation. Equivalent Values of Drive Parameters, Components of Load Torques, Nature and Classification of Load Torques, Calculation of Time and Energy Loss in Transient Operations, Steady State Stability, Load Equalization. **Control Electrical Drives:** Modes of Operation, Speed Control and Drive Classifications, Closed loop Control of Drives	**08**
Revised Bloom's Taxonomy Level: L_1 – Remembering, L_2 – Understanding, L_3 – Applying, L_4 – Analysing	
Module-2	
Direct Current Motor Drives: Controlled Rectifier Fed dc Drives, Single Phase Fully Controlled Rectifier Control of dc Separately Excited Motor, Single Phase Half Controlled Rectifier Control of dc Separately Excited Motor, Three Phase Fully Controlled Rectifier Control of dc Separately Excited Motor, Three Phase Half Controlled Rectifier Control of dc Separately Excited Motor, Multiquadrant Operation of dc Separately Excited Motor Fed Form Fully Controlled Rectifier, Rectifier Control of dc Series Motor, Supply Harmonics, Power Factor and Ripple in Motor Current, Chopper Control of Separately Excited dc Motor, Chopper Control of Series Motor	**08**
Revised Bloom's Taxonomy Level: L_1 – Remembering, L_2 – Understanding, L_3 – Applying, L_4 – Analysing	
Module-3	
Induction Motor Drives: Analysis and Performance of Three Phase Induction Motors, Operation with Unbalanced Source Voltage and Single Phasing, Operation with Unbalanced Rotor Impedances, Analysis of Induction Motor Fed From Non-Sinusoidal Voltage Supply, Starting, Braking, Transient Analysis. Speed Control Techniques-Stator Voltage Control, Variable Voltage Frequency Control from Voltage Sources, Voltage Source Inverter (VSI) Control, Cycloconverter Control, Closed Loop Speed Control and Converter Rating for VSI and Cycloconverter Induction Motor Drives, Variable Frequency Control from a Current Source, Current Source (CSI) Control, current regulated voltage source inverter control, speed control of single phase induction motors.	**08**
Revised Bloom's Taxonomy Level: L_2 – Understanding, L_3 – Applying, L_4 – Analysing, L_5 – Evaluating	
Module-4	

Synchronous Motor Drives: Operation from fixed frequency supply-starting, synchronous motor variable speed drives. Variable frequency control of multiple synchronous motors, Self-controlled synchronous motor drive employing load commutated thruster inverter, Starting Large Synchronous Machines, Permanent Magnet ac (PMAC) Motor Drives, Sinusoidal PMAC Motor Drives, Brushless dc Motor Drives. **Stepper Motor Drives:** Variable Reluctance, Permanent Magnet, Important Features of Stepper Motors, Torque Versus Stepping rate Characteristics, Drive Circuits for Stepper Motor.		**08**
Revised Bloom's Taxonomy Level	L_1 – Remembering, L_2 – Understanding, L_3 – Applying, L_4 – Analysing	
Module-5		
Energy conservation in Electrical Drives: Losses in electrical drive system, Measures for energy conservatio in Electrical drives, Energy efficient operation of drive, use of right rating motors, improvement of quality of supply. **Solar powered Drives:** Solar powered pump drives, solar powered Electric vehicles. **Industrial Drives**: Textile Mills, Steel Rolling Mills, Cranes and Hoists, Machine Tools, use of single to three phase semiconductor converters in rural applications.		**08**
Revised Bloom's Taxonomy Level	L_1 – Remembering, L_2 – Understanding, L_3 – Applying, L_4 – Analysing	
Course outcomes:	**Course Outcomes:** At the end of the course the student will be able to: **CO1-Analyze** the dynamics, modes of operation and control of electric drives**.** [L4] **CO2-Analyze** the performance & control of DC motor drives using controlled rectifiers. [L4] **CO3- Analyze** the performance & control of induction motor drives under different conditions. [L4] **CO4- Analyze** operations & Control of synchronous motors, stepper motor drives and Solar powered Drives. [L4] **CO5- Apply** suitable electrical drives for specific application in the industry & discuss their Energy conservation. [L3]	
Graduate Attributes (As per NBA) Engineering Knowledge, Problem Analysis, Design/ Development of Solutions, Modern Tool Usage		

Textbook

1.	Fundamentals of Electrical Drives	Gopal K. Dubey	Narosa Publishing House	2nd Edition, 2001
2.	Electrical Drives: Concepts and Applications (Refer to chapter 07 for Industrial Drives under module 5.)	Vedum Subrahmanyam	McGraw Hill	2nd Edition, 2001

Reference Books

1.	Electric Drives	N.K De, P.K. Sen	PHI Learning	1st Edition, 2009

List of URLs, Text Books, Notes, Multimedia Content, etc

1. https://nptel.ac.in/courses/108102046/
2. https://nptel.ac.in/courses/108108077/
3. http://www.nptelvideos.in/2012/11/advanced-electric-drives.html
4. http://eps-technology.blogspot.com/2011/02/online-video-courses-electric-drives.html

University Exam Question paper pattern:

1. The question paper will have ten full questions carrying equal marks. Each full question consisting of 16 marks.
2. There will be two full questions (with a maximum of four sub questions) from each module.
3. Each full question will have sub question covering all the topics under a module.
4. The students will have to answer five full questions, selecting one full question from each module..

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Course Code:	BEE702	TITLE: Industrial Drives and Applications										
List of Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	2
CO2	3	3	2	-	-	-	-	-	-	-	-	2
CO3	3	3	2	-	-	-	-	-	-	-	-	2
CO4	3	3	2	-	-	-	-	-	-	-	-	2
CO5	3	2	2	-	-	2		-	-	-	-	2

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution '-'= No Contribution

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Course Code:	BEE702	TITLE: Industrial Drives and Applications
List of Course Outcomes	PSO1	PSO2
CO-1	3	-
CO-2	3	-
CO-3	3	-
CO4	3	-
CO5	3	-

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution '-'= No Contribution

Course Coordinator **Vertical Head** **HoD**