18PEC24	ADVANCED ELECTRICAL DRIVES LABORATORY	L	T	P	C
		0	0	4	2

Course Objectives:

1.	To analyze the operation of DC and AC motor drives
2.	To study the performance of PMSM, BLDC and SRM drives
3.	To gain knowledge on closed loop control of PMSM, BLDC and SRM drives.

LIST OF EXPERIMENTS:

1. Four quadrant chopper fed DC motor drive
2. V/f control of three phase induction motor with voltage source inverter
3. DSP based speed control of SRM motor
4. DTC control of Induction motor drive
5. Self-controlled synchronous motor drive
6. Closed loop control of PMSM motor
7. Simulation study of four quadrant operation of DC drives using dual converter circuit
8. Simulation study of Field oriented control induction motor drive
9. Simulation study of CSI fed three phase induction motor drive
10. Simulation study of closed loop control of BLDC motor drive

Total (60+0)= 60 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	*Design closed loop control for PMSM and SRM drives.*
CO2	:	*Analyze the operation of VSI and CSI fed induction motor drives*
CO3	:	*Select suitable inverter configuration and control for three phase induction motor drives.*
CO4	:	*Analyze the operation of synchronous motor drives.*
CO5	:	*Use digital control for special motor drives.*

PO / CO	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	*Design closed loop control for PMSM and SRM drives.*	2		3	2		1		2		1	
CO2	*Analyze the operation of VSI and CSI fed induction motor drives*	1	3						1			
CO3	*Select suitable inverter configuration and control for three phase induction motor drives.*	3		1					1			2
CO4	*Analyze the operation of synchronous motor drives.*	1	3						2			
CO5	*Use digital control for special motor drives.*	2			3	1			1			

18PEE11	ADVANCED MICROCONTROLLER BASED SYSTEM DESIGN	L	T	P	C
		3	0	0	3

Course Objectives:

1.	To implement digital control for power electronic applications
2.	To learn various DSP peripherals for proper implementations to power applications

Unit I	INTRODUCTION TO DSPIC 30F DIGITAL SIGNAL CONTROLLER	9	+	0

dsPIC 30F CPU Core – Programmers Model – CPU Registers – DSP Engine – Memory Organization – Data – Program – Flash and EEPROM Programming.

Unit II	SYSTEM CONFIGURATION	9	+	0

Oscillator Configuration – Power saving Modes - Various Resets – Device Configuration – Low Voltage Detect - I/O Ports

Unit III	CONTROL PERIPHERALS	9	+	0

Study, Configuration and control - Interrupt Structure – Timers – Capture and Compare – AD Converter– Introduction to IDE for dsPIC and Project development with simple C programming.

Unit IV	MOTOR CONTROL PERIPHERALS	9	+	0

Motor Control PWM – Different PWM modes – Dead Time – Output and Polarity Control – PWM Fault Pins – Quadrature Encoder Interface

Unit V	APPLICATIONS	9	+	0

Closed loop Control of Single and three Phase VSI, Sensored and Sensorless BLDC Motor Control – AC Induction Motor Control – Vector Control of AC Induction Motor - Servo Control of a DC-Brush Motor - Four Channel Digital Voltmeter with Display

Total (L+T)= 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	*Understand various DSP peripherals*
CO2	:	*Understand the configurations of peripherals for appropriate power applications*
CO3	:	*Write C coding for implementing controls using peripherals*
CO4	:	*Implement interfacing techniques with DSC for control applications*
CO5	:	*Understand and implement data acquisition and processing for control application and implement control techniques for power electronic applications*

Reference Books:

1.	dsPIC30FFamily Reference Manual, Datasheets.
2.	Creed Huddleston, “Intelligent Sensor Design using Microchip dsPIC ", Newnes, 2007.
3.	Zoran Milivojević, DjordjeŠaponjić, “Programming dsPIC (Digital SignalControllers) in C”, MicroElectronika

PO / CO	CO Statement	PO1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO1 1
CO1	*Understand various DSP peripherals*	1	1	1	1	1		1	1	1	1	1
CO2	*Understand the configurations of peripherals for appropriate power applications*	1	1	1	1	1		1	1	1	1	1
CO3	*Write C coding for implementing controls using peripherals*	1	1	1	1	1		1	1	1	1	1
CO4	*Implement interfacing techniques with DSC for control applications*	1	1	1	1	1		1	1	1	1	1