COURSE TITLE : POWER ELECTRONICS
COURSE CODE : 5032
COURSE CATEGORY : A
PERIODS/WEEK : 4
PERIODS/SEMESTER : 52
CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Power electronics components and Commutation techniques	13
2	Convertors and inverters	13
3	Electric drives	13
4	Regulated power supply	13
Total		**52**

Course Outcome:

Sl.	Sub	**On completion of this course the student will be able:**
1	1	To comprehend different types of power electronics components.
2	1	To understand convertor circuits.
	2	To understand inverter.
3	1	To understand chopper.
	2	To understand Electric Drives
4	1	To understand various types of regulated power supplies.

Specific Outcome:

MODULE I Power electronics components and Commutation techniques

1.1.1 To explain the structure and characteristics of UJT and its application.
1.1.2 To describe the structure and operation of N-channel JFET with its characteristics.
1.1.3 To describe the structure and operation of P-channel JFET with its characteristics.
1.1.4 To distinguish between JFET and BJT.

1.1.5 To list the applications of BJT.
1.1.6 To explain the operation of MOSFET.
1.1.7 To differentiate JFET, MOSFET, and IGBT.
1.1.8 To describe the operation of DIAC.
1.1.9 To describe the operation of TRIAC.
1.1.10 To explain the structure of SCR.
1.1.11 To explain the characteristics of SCR.
1.1.12 To describe the terms – holding current, latching current, turn on time and turn off time
1.1.13 To explain the different methods of turning on of SCR- resistance triggering, voltage triggering, dv/dt
triggering gate triggering.
1.1.14 To understand the commutation technique
1.1.15 To explain the natural commutation.
1.1.16 To explain the forced commutation.
1.1.17 To explain the gate turn off method.

MODULE II Convertors and inverters

2.1.1. To describe the principles of phase control.
2.1.2 To describe single phase half wave converter with R load.
2.1.3 To describe single phase half wave converter with RL load and freewheeling diode.
2.1.4 To describe single phase full wave converter with resistive load.
2.1.5 To describe single phase full wave converter with RL load and freewheeling diode.
2.1.6 To describe fully controlled bridge converter with resistive load.
2.1.7 To describe fully controlled bridge converter with RL load and freewheeling diode.

2.2.1 To explain the principle of DC chopper.
2.2.2 To explain the constant frequency and variable frequency method.
2.2.3 To describe the classification of inverters.
2.2.4 To describe series inverter.
2.2.5 To describe parallel inverter.
2.2.6 To describe inverter- half bridge inverter.
2.2.7 To describe inverter- full bridge inverter.
2.2.8 To explain three phase bridge inverter.

MODULE III Electric drives

3.1.1 To explain Single phase semi converter DC drives.
3.1.2 To explain Single phase full converter DC drives.
3.1.3 To explain Single phase dual converter DC drives.

3.2.1 To explain Speed control of single phase Induction motor.
3.2.2 To explain Speed controls of three phase Induction motor.
3.2.3 To explain Stator voltage control.
3.2.4 To explain Stator frequency control.
3.2.5 To explain v/f control.
3.2.6 To explain solid state control of a typical fan regulator.
3.2.7 To explain the concept of induction cooking system control.

MODULE IV Regulated power supply

4.1.1 To explain the operation of buck converter.
4.1.2 To explain the boost converter.
4.1.3 To differentiate between buck and boost converter.
4.1.4 To explain the principle of the servo stabilizer.
4.1.5 To draw the block diagram of static servo stabilizer.

4.2.1 To describe the principle of Pulse Width Modulation.
4.2.2 To study the SMPS.
4.2.3 To draw the block diagram of SMPS.
4.2.4 To distinguish between linear power supply and SMPS.
4.2.5 To explain the operation of UPS.
4.2.6 To list the classification of UPS.
4.2.7 To describe ONLINE UPS.
4.2.8 To describe OFFLINE UPS.
4.2.9 To describe line interactive UPS.
4.2.10 To describe the specification of UPS.
4.2.11 To explain the testing methods of UPS.

CONTENT DETAILS

MODULE I

Power electronic components - characteristics of UJT and its application- construction & operation of N - channel and P-channel construction & operation of JFET with characteristics- JFET comparison with BJT-MOSFET -Differentiate JFET,MOSFET, and IGBT-Symbols, operations and characteristics of di, tri, SCR – constructional features – operation – transistor analogy – characteristics – definitions -holding current – latching current - turn on time – turn off time-different methods of turn on and turning off SCR - snubber circuits for the protection of SCR.

MODULE II

Converter & Inverter circuits - Half and full wave control circuit - single phase-half wave converter with R,RL load and freewheeling diode, full wave and bridge converters with R , RL load and freewheeling diode -3 phase bridge converter with R, RL load and freewheeling diode -DC chopper circuits - Principles of operation - control of chopping periods – variable frequency control –constant frequency control – principle of operation with wave forms Inverters: - Requirements of Practical inverters - single phase series inverter –parallel inverters

MODULE III

Electric Drives - principle and working of the following-Single phase semi converter DC drives-Single phase full converter DC drives-single phase dual converter DC drives- speed control of single phase Induction motor -speed control of three phase Induction motor-stator voltage control-stator frequency control-stator voltage& frequency control

MODULE IV

Power Supplies - Principle of Servo stabilizer (Block Diagram approach)-Principle of Pulse Width Modulation - SMPS (Block Diagram approach)-Compare linear power supply and SMPS - classification of U.P.S-Online, Offline-specification-operation of buck & boost converter (block diagram).

REFERENCE

1. P. S. Bimbra. Power Electronics*:* Khanna publishers
2. Dr. B.R. Gupta *V&* Singhal. Power Electronics*:* S. K. Kataria & Sons
3. Biswanath Paul. Industrial Electronics *and* Control : PHI Learning Pvt. Ltd
4. S.K. Bhattacharya. Fundamentals of Power Electronics: Vikas Publication House Pvt Ltd