

Subject	Power Electronics	Course Code	CT318	Theoretical	3hrs / wk
Semester	5	Prerequisite	CT217	Practical	3hrs / wk

Program Learning Component

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Week 1-3	1. Understands the power electronic devices, and its firing and protection techniques.		
	Specific Learning Outcomes	Resources	Practical
	Power electronics and power electronic devices: <ul style="list-style-type: none"> • Explains PN junction, power diode and draws its characteristics. Defines their applications. • Power transistors (BJT, MOSFET, IGBT, etc...). • Explains operation and protection of power transistors. • Explains thyristor (SCR, triac, GTO, etc). Draws firing and protection circuits for thyristors. • Operational Amplifier circuits 	A computer & data-show. White board	By experiment the student should verify <ul style="list-style-type: none"> • Interpreting the data sheets for power electronic devices. • Interpreting the diode characteristics and diode testing, • Interpreting thyristor characteristics and thyristor testing.
Week 4-5	2. Able to determine the average value of the output voltage and current. Exams the effect of the inductive load on the rectification process.		
	Specific Learning Outcomes	Resources	Practical
	Power electronics circuits (controlled) <ul style="list-style-type: none"> • Thyristors : characteristics, turn-on, turn-off, snubber circuits, firing circuits, single phase half-wave semi-converter, full converter, dual converter, resistive and inductive loads, three phase converters 	A computer & data-show. White board	By experiment the student should verify: <ul style="list-style-type: none"> • Operation of thyristor firing circuits. • Single phase controlled rectifier with resistive load. • Demonstrates effect of inductive load on the single phase controlled rectifier.

			<ul style="list-style-type: none"> • Three phase controlled rectifier with resistive load.
Week 6-7	3. Understands the AC voltage controller.		
	Specific Learning Outcomes	Resources	Practical
	AC voltage controllers <ul style="list-style-type: none"> • On-off control, single phase unidirectional, bi-directional, with inductive loads, three phase half-wave, full-wave cyclo-converters. 	A computer & data-show. White board	By experiment the student should verify: <ul style="list-style-type: none"> • Speed control of AC motor using phase controllers. • Speed control of universal motor using a traic. • 3- Build a test control circuits.
Week 8-9	4. Understands the theory of operation of different types of chopper circuits.		
	Specific Learning Outcomes	Resources	Practical
	Choppers Power transistors: characteristics, series and parallel operation, $\frac{di}{dt}$ and $\frac{dv}{dt}$ limitations, isolation of gate and base drives, step-up and step-down chopper operation, classification, regulators, thyristors chopper circuits.	A computer & data-show. White board	By experiment the student should verify: <ul style="list-style-type: none"> • Speed control of DC motor using choppers. • Build a test circuits chopper circuits.
Week 10-12	5. Understands the theory of operation of inverters with the control of voltage and frequency		
	Specific Learning Outcomes	Resources	Practical
	Inverters Principle of operation, performance parameters, single phase and three phase PWM inverters.	A computer & data-show. White board	By experiments the student should verify: <ul style="list-style-type: none"> • Speed control of DC motors using controlled rectifier circuits (Thyristors). • Build a test control circuit.
Week			

13-14	Specific Learning Outcomes	Resources	Practical
	<ul style="list-style-type: none"> • Introduction to linear and switching mode Power supplies and the AC voltage stabilizer circuits. 	A computer & data-show. White board	<ul style="list-style-type: none"> • Troubleshooting and maintenance of power supply and checking power electronic devices