

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
III B. Tech I Semester Regular/Supplementary Examinations, April/May -2025
POWER ELECTRONICS
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

		UNIT-I	
1.	a)	Explain the operation of SCR two transistor analogy?	[7M]
	b)	Explain the operation of Power IGBT with the help of schematic diagram. Also give its characteristics.	[7M]
		(OR)	
2.	a)	Derive the static equalizing and dynamic equalizing circuit parameters with respect to series operation of SCR	[7M]
	b)	Explain Thyristor gate characteristics with neat diagrams.	[7M]
		UNIT-II	
3.	a)	Explain the operation of a single phase half controlled converter. Draw the output voltage and current waveforms for a R load.	[7M]
	b)	A single phase fully controlled bridge converter is supplied at 230V, 50Hz, with source inductance of 2mH. Neglecting resistance voltage drop, when the converter is operating at a firing angle of 45° and the load current is constant at 10A. Determine also the load voltage.	[7M]
		(OR)	
4.	a)	Explain the principle of operation of single phase fully controlled bridge converter for firing angle 45° also sketch the following waveforms of Load voltage and current waveforms Thyristor voltage and current waveforms Supply voltage and current waveforms	[7M]
	b)	Explain the effect of freewheeling diode in detail. Also, justify the statement "Freewheeling diode improves the power factor the system".	[7M]
		UNIT-III	
5.	a)	Describe the effect of source inductance on the performance of a 3-phase full converter with the help of phase voltage waveforms. Indicate the sequence of conduction of various thyristors and sketch load current waveforms for both positive and negative group of thyristors.	[7M]
	b)	A step up chopper with a pulse width of 100 micro seconds is operating from 230 V dc supply. Compute the average value of load voltage for a chopping frequency of 2000 Hz.	[7M]
		(OR)	
6.	a)	Discuss the working of single phase midpoint cyclo converter when feeding R and RL loads with neat circuit diagram and relevant output waveforms.	[7M]
	b)	Explain the influence of source inductance of the output voltage of a 3-phase 6 pulse fully controlled converter. Draw the necessary wave forms and derive an expression for the output DC voltage.	[7M]
		UNIT-IV	

7.	a)	A step up chopper with a pulse width of 100 micro seconds is operating from 230 V dc supply. Compute the average value of load voltage for a chopping frequency of 2000 Hz.	[7M]
	b)	Describe the basic principle of working of bridge type single phase to single phase step down cycloconverter for discontinuous conduction mode.	[7M]
		(OR)	
8.	a)	What is a dc chopper? Describe the working of type-B chopper. Does it operate as a step down or step up chopper? Explain.	[7M]
	b)	What is pulse width modulation? List the various PWM techniques. How do these differentiate from each other?	[7M]
		UNIT-V	
9.	a)	Describe briefly with neat circuit diagram and waveforms of three phase VSI in 120 degrees conduction mode.	[7M]
	b)	Compare Single pulse width modulation over Multiple pulse width modulation technique.	[7M]
		(OR)	
10.	a)	Describe the working principle of a single phase full bridge inverter with neat circuit diagram and waveforms. What is its main drawback?	[7M]
	b)	What is the need for controlling the voltage at the output terminals of an inverter? Describe briefly and compare the various methods employed for the control of output voltage of inverters.	[7M]

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