

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURUJADA VIZINAGARAM
III B. Tech I Semester Regular Examinations November -2025
POWER ELECTRONICS
(EEE)

Time: 3 hours

Max. Marks: 70

The Question paper consists of Part A & Part B.

Part A is compulsory, Answer all questions. Part B Answers any one question from each unit.

1		PART-A	(20Marks)
	a)	Define Latching Current.	[2]
	b)	Draw the switching characteristics of Power MOSFETs.	[2]
	c)	List any two advantages of freewheeling diode in phase controlled rectifiers.	[2]
	d)	Write the effect of source inductance in Single-phase fully controlled bridge rectifier	[2]
	e)	What are the important features of three phase semi converters?	[2]
	f)	What are the applications of Cycloconverters?	[2]
	g)	Explain the principle of current limit control in case of choppers.	[2]
	h)	Write the applications of step up choppers.	[2]
	i)	What type switches are preferable in the voltage source inverter and current source inverters?	[2]
	j)	List the differences between 120° and 180° conduction modes of operation.	[2]
		PART-B	(50Marks)
		Question from Unit - I	
2	a)	Compare the Power MOSFET and IGBT?	[5]
	b)	Explain the operation of snubber circuit and also design the parameters of snubber circuit.	[5]
		(OR)	
3	a)	Discuss the different turn on methods of SCR?	[5]
	b)	Compare the different triggering methods like R, RC and UJT firing circuits.	[5]
		Question from Unit - II	
4	a)	Explain about the effect of source inductance in single-phase full converter with neat sketch.	[5]
	b)	Write the advantage of freewheeling diode in single phase half controlled rectifier with RL load.	[5]
		(OR)	
5	a)	Briefly explain the operation of single-phase dual converter.	[5]
	b)	Describe the working of single phase full controlled converter for $\alpha = 30^\circ$ with relevant waveforms and derive expression for average output voltage.	[5]
		Question from Unit - III	
6	a)	Explain the operation of three phase half converter with neat sketch for R load?	[5]

	b)	A three phase half controlled bridge converter is supplying dc load of 400 V, 60 A from a three phase 660 V (line), 50 Hz AC Supply. If the thyristors have a voltage drop of 1.2V when conducting, neglecting overlap, compute: i) firing angle of thyristors, ii) RMS value of thyristors currents.	[5]
		(OR)	
7	a)	Discuss the operation Single-phase AC-AC power control by phase control with R and RL loads.	[5]
	b)	Explain the operation of single phase step up cycloconverter with neat sketch?	[5]
		Question from Unit - IV	
8	a)	Explain the operation of boost converter in the CCM mode and obtain the expression for amplitude of ripple current.	[5]
	b)	A boost converter has the input voltage of 100 V and it operates at 1 kHz, when the average load current is 50 A, the load resistance is 3 Ω . Determine the value of inductance to limit the maximum peak to peak ripple current through inductor to 5% ?	[5]
		(OR)	
9	a)	With help of neat circuit diagram and associated waveforms discuss the operation of a Buck converter in discontinuous conduction mode.	[5]
	b)	Explain the different control strategies in DC-DC circuits?	[5]
		Question from Unit - V	
10	a)	Explain about the 120 degree mode of operation of a three phase voltage source inverter with neat sketches of phase and line voltage waveforms?	[5]
	b)	Compare the voltage source inverter and current source inverters?	[5]
		(OR)	
11	a)	With a neat circuit diagram, explain the principle of operation of a single phase full bridge inverter.	[5]
	b)	Single phase full bridge inverter has a resistive load of R= 2.4 ohms and DC input voltage of 48 volts. Calculate: i) RMS output voltage at fundamental frequency, ii) output power, iii) Average and peak current of each thyristors.	[5]
