

Code: 20EE3502

**III B.Tech - I Semester – Regular / Supplementary Examinations
NOVEMBER 2024**

**POWER ELECTRONICS
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Explain the static VI- characteristics of a SCR with a neat diagram.	L2	CO4	7 M
	b)	Discuss the operation of N-channel enhancement power MOSFET with neat characteristics.	L2	CO1	7 M
OR					
2	a)	Discuss any five turn-on methods of SCR.	L2	CO2	7 M
	b)	Explain the switching action of SCR with two transistor model.	L2	CO2	7 M
UNIT-II					
3	a)	List any five applications of phase controlled rectifiers.	L2	CO2	5 M
	b)	Explain the principle of phase control for a single phase half wave rectifier with R load.	L2	CO2	9 M

OR					
4	a)	With circuit diagram and waveforms explain the working of single phase full wave rectifier with RL load.	L3	CO2	7 M
	b)	A single phase fully controlled bridge converter is fed from 230V, 50Hz supply. The load is highly inductive. Determine the average load voltage and load current for 10 Ω load resistance considering the firing angle of 45° . Also draw the supply current waveform.	L3	CO4	7 M
UNIT-III					
5	a)	Differentiate VSI and CSI.	L2	CO3	5 M
	b)	Explain the operation of Multilevel Cascaded H-bridge inverter feeding R-load with neat waveforms.	L3	CO3	9 M
OR					
6	a)	Explain 180° conduction mode for Voltage source Inverter.	L2	CO3	7 M
	b)	Discuss the working of single phase parallel inverter with relevant circuit and waveform.	L2	CO5	7 M
UNIT-IV					
7	a)	Explain the operation of a Buck converter with neat waveforms and derive the expression for average output voltage.	L2	CO4	7 M
	b)	A step down chopper has a resistive load of 12Ω and an input voltage of 200 V. The	L3	CO4	7 M

		semiconductor switch has 2 V drop across it. If the chopper operating frequency is 1kHz and duty cycle is 0.4, determine the following: i. Average output voltage. ii. RMS output voltage. iii. Chopper efficiency.			
OR					
8	a)	With a neat diagram explain four quadrant operation of chopper.	L2	CO4	7 M
	b)	Deduce the expression for the output voltage with a neat circuit and waveform of a Boost chopper.	L4	CO2	7 M
UNIT-V					
9	a)	With neat diagram and waveform explain the operation of single phase AC voltage controller for R-Load.	L2	CO3	7 M
	b)	Deduce an expression for rms output voltage for a single phase AC voltage controller with RL load.	L4	CO5	7 M
OR					
10		Illustrate the operation of midpoint and bridge type step up cyclo converter with RL load and neat waveforms.	L3	CO3	14 M