Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U1501

M.E. DEGREE EXAMINATION, DEC 2025

Power Electronics and Drives

21PPE101 – POWER ELECTRONIC COVERTORS

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1.	(a)	Analyze the factors limiting the switching speed of IGBT and BJT. How do these limitations dictate their suitable applications?	CO1-Ana	(20)
		Or		
	(b)	Analyze the factors limiting the switching speed of SCR and MOSFET. How do these limitations dictate their suitable applications?	CO1-Ana	(20)
2.	(a)	Analyze the output ripple of a three-phase fully controlled converter for an RL load. How does the load inductance influence the ripple?	CO4-Ana	(20)
		Or		
	(b)	Perform a harmonic analysis of a dual converter in both circulating current and non-circulating current modes. Discuss the implications for efficiency and waveform quality.	CO4-Ana	(20)
3.	(a)	Analyze the operation of a Buck-Boost converter under varying input voltages. Discuss how it maintains a stable output voltage and its limitations.	CO3-Ana	(20)
		Or		
	(b)	Analyze the impact of different control strategies (ON/OFF control, PWM control) on the performance of a step-down DC chopper.	CO3-Ana	(20)
4.	(a)	Analyze the effect of switching frequency on the output voltage, efficiency, and harmonic content of a three-phase bridge inverter in 120 degree mode. Discuss the trade-offs involved.	CO4-Ana	(20)
		Or		

	(b)	Compare the performance of Cascaded H-Bridge, and Diode-Clamped, multilevel inverters in terms of efficiency, cost, and harmonic reduction.	CO4-Ana	(20)
5.	(a)	Evaluate the Total Harmonic Distortion (THD) in the output of a single-phase bidirectional controller for an R-L load. Discuss its effect on system performance.	CO4-Ana	(20)
		Or		
	(b)	Compare the operation of a three-phase cycloconverter and a matrix converter in terms of efficiency, harmonic distortion, and control complexity.	CO4-Ana	(20)