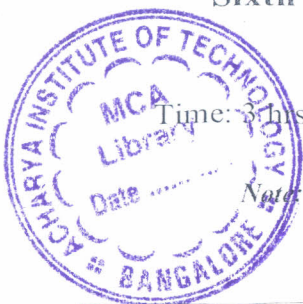


Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025

Power Electronics



Time: 3 hrs.

Max. Marks: 100

- Notes: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	What are the different types of power converters? Explain.	10	L2	CO1
	b.	Define power electronics. List the applications of power electronics.	10	L2	CO1
OR					
Q.2	a.	With necessary waveforms, explain the switching characteristics of power MOSFET.	10	L2	CO1
	b.	Draw the symbol and control characteristics of i) SCR ii) GTO iii) Transistor iv) IGBT	10	L2	CO1
Module – 2					
Q.3	a.	Explain the V.I characteristics of SCR with different operating modes.	10	L2	CO2
	b.	Explain with the help of a circuit diagram and relevant waveforms the commutation of a SCR using an LC circuit.	10	L2	CO2
OR					
Q.4	a.	Derive an expression for anode current in terms of common base current gain of the transistor.	10	L3	CO2
	b.	Explain UJT relaxation oscillator with the help of circuit diagram and waveforms.	10	L2	CO2
Module – 3					
Q.5	a.	With neat circuit diagram and waveforms, explain operation of single phase AC voltage controller using ON-OFF control. Derive an expression for RMS value of output voltage.	10	L3	CO3
	b.	Explain the operation of a bidirectional AC voltage controller for an inductive load.	10	L2	CO3
OR					
Q.6	a.	Explain the operation of single phase semi converter with circuit diagram and waveforms. Derive an expression for average value of output voltage (Assume R-L load).	10	L3	CO3
1 of 2					

	b.	A single phase ac voltage controller has a resistive load $R = 10\Omega$, and the input voltage is $V_s = 120V$, 60 Hz. The delay angle of thyristor T_1 is $\alpha = \pi/2$. Determine : i) The rms value of output voltage. ii) The input PF iii) The average input current.	10	L3	CO3
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Module – 4

Q.7	a.	Explain the principle of operation of step-up chopper with circuit diagram and waveform.	10	L2	CO4
	b.	The dc converter has a resistive load of $R = 10\Omega$, and the input voltage is $V_S = 220 V$. When the converters switch remains on, its voltage drop is $V_{ch} = 2V$ and the chopping frequency $f = 1 \text{ kHz}$. If the duty cycle is 50% determine: i) The average output voltage V_a ii) The rms output voltage V_o iii) The converter efficiency iv) The effective input resistance R_i of the converter.	10	L3	CO4

OR

Q.8	a.	With neat diagram, explain four quadrant operation of a chopper.	10	L3	CO4
	b.	Describe the principle of step-down chopper of resistive load, with the help of schematic and wave diagram. Derive an expression of the output voltage.	10	L3	CO4

Module – 5

Q.9	a.	Giving neat circuit diagram and waveforms, explain the working of single phase half bridge inverter with inductive load.	10	L2	CO5
	b.	Write a note on performance parameters of an inverter. i) Harmonic factor of n^{th} harmonic ii) THD iii) DF	10	L2	CO5

OR

Q.10	a.	With neat circuit diagram, explain the operation of a three phase inverter in 180° conduction mode with star connected R load.	12	L3	CO5
	b.	Compare voltage source inverter and current source inverter.	8	L2	CO5
