

QP Code : 5052

(3 Hours)

[Total Marks : 80

- N.B. : (1) Question No. 1 is compulsory.
(2) Solve any three questions out of remaining five question.
(3) Figures to the right indicate full marks.

1. (a) Draw and explain V-I characteristics of SCR. 5
(b) What is the need of freewheeling diode in controlled rectifier. Explain with example. 5
(c) What do you understand by $\frac{di}{dt}$ and $\frac{dv}{dt}$ rating of SCR. 5
(d) Explain the principle step down chopper. State load voltage equation. 5
2. (a) Explain half controlled rectifier using SCR. Draw waveforms and derive the relation for output load voltage. 10
(b) Draw and explain single phase full bridge inverter. Draw waveforms. 10
3. (a) Single phase half bridge inverter has a resistive load of 3Ω and the dc input voltage $E_{dc} = 50$ V. Calculate
(i) RMS output voltage at the fundamental frequency
(ii) Output power P_o
(iii) The average and peak current of each thyristor.
(iv) The peak reverse blocking voltage of each thyristor.
4. (a) Explain the working of single phase to single phase cycloconverter with purely resistive load. Draw circuit diagram and waveforms. 10
(b) The input voltage to the buck-boost convertor is $E_{dc} = 14$ V. The duty cycle $a = 0.6$ and the switching frequency is 25 KHz. The inductance $L = 180 \mu\text{H}$ and filter capacitance $C = 220 \mu\text{H}$. The average load current $I_o = 1.5$ A. calculate
(a) The average o/p voltage E_o
(b) The peak-to-peak output voltage ripple ΔV_c
(c) The peak-to-peak current of inductor ΔI
(d) The peak current of the device I_p

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5. (a) Explain circuit diagram and working of three phase inverter 180° conduction mode with resistive load. 10
- (b) Differentiate between symmetrical and asymmetrical IGBT. 5
- (c) Draw and explain switching characteristics of IGBT. 5
6. (a) Explain the voltage control technique in inverter using sinusoidal pwm method. Justify the use of it reduces harmonics. 10
- (b) Draw and explain dual convertor with all four quadrants of operation. 5
- (c) Define forced commutation. Explain Class D commutation with respect to circuit diagram, working and waveforms. 5
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