

12. (a) With relevant wave forms, derive the expression for average and rms value of output voltage in a single phase full controlled converter with RL load. (16)

Or

- (b) (i) Explain the operating principle of single phase dual converter with neat waveforms. (10)
- (ii) A 1 phase full converter is feeding a RLE load with the source voltage of 230 V, the average load current is 10 A and $R = 0.4\Omega$, $L = 2mH$. Find the firing angle α for $E = 120V$ and $E = -120V$. (6)
13. (a) Derive the expression for voltage gain in a dc - dc boost converter and explain the modes of operation with relevant waveforms. (16)

Or

- (b) Explain the working principle of voltage commutated chopper showing the current and voltage waveform across each device.
14. (a) With the neat sketch and output waveforms, discuss the operation of three phase inverter operating in 180° mode. (16)

Or

- (b) (i) Comparison between Voltage source inverter and current source inverter. (8)
- (ii) Explain any one method to reduce the harmonic content in the inverter. (8)
15. (a) Explain the working of three phase to single phase cycloconverter with neat circuit diagrams and necessary waveforms. (16)

Or

- (b) Explain the working of two stage sequence control of AC Voltage controller. (16)