

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2015

Electrical and Electronics Engineering
(POWER SYSTEMS)

04 EE 6303 POWER ELECTRONIC CIRCUITS

Max. Marks : 60

Duration: 3 Hours

Part A - Answer All Questions (Each Question carry 3 Marks)

1. Discuss the static characteristics of thyristors.
2. Derive a relationship between average output voltage and input voltage of a three phase semiconverter when $\alpha < 60^\circ$.
3. Compare circulating and non-circulating operating modes of dual converter.
4. What are the various control strategies employed in choppers?
5. Draw the schematic diagram of a full bridge transformer isolated buck converter.
6. Explain the push-pull DC to DC converter configuration.
7. Explain the operation of a full bridge inverter.
8. What are the various methods of voltage control in single phase inverters?

Part B – Answer All Questions (Each Question carry 6 Marks)

9. Discuss the various protection schemes required for SCR.

Or

10. Describe the characteristics of power diodes.
11. (a) Discuss the inversion mode of operation of a single phase fully controlled rectifier with RLE load with neat waveforms.
(b) In a three phase half wave converter, three phase supply has 200V/phase. Determine the average load voltage for firing angle of 0° , 30° and 60° . Assume a thyristor voltage drop of 1.5V.

Or

12. With necessary circuit and waveforms, explain the principle of operation of single phase semiconverter and derive the expression for the average and rms output voltage.
13. With neat circuit diagram and waveforms explain the operation of a three phase dual converter with circulating current mode of operation.

Or

14. (a) Derive DF, CDF and THD for a single phase full converter.
(b) A single phase full wave converter is operated from 230V, 50Hz supply source and the load resistance is $R = 12\Omega$. For a firing angle of 30° , determine rectification efficiency.
15. Explain the buck converter with neat circuit diagram and mathematical expression for output voltage.

Or

16. Explain multi output boost converter.
17. Explain the operation of flyback DC to DC converter.

Or

18. Explain the operation of forward DC to DC converter.
19. Outline the various methods of harmonic reduction in inverters.

Or

20. Explain the operation of diode clamped multilevel inverter.