

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SECOND SEMESTER M. TECH DEGREE EXAMINATION
Electrical & Electronics Engineering
04EE6301—Power Electronics Devices and Circuits

Max. Marks: 60

Duration: 3 Hours

PART A

Answer All Questions

Each question carries 3 marks

1. Draw and explain the dynamic characteristics of an IGBT.
2. Explain the working of a GTO.
3. Explain the principle of operation of chopper circuit.
4. Explain the differences between unipolar and bipolar modulation.
5. Explain the operation of single phase AC voltage controller with R-L load with suitable waveforms
6. What are the advantages of multilevel inverters?
7. Explain the working of a cyclo converter.
8. Explain any two control strategies for PWM rectifier.

PART B

Each question carries 6 marks

9. Explain the V-I characteristics of an SCR.

OR

10. Explain the four modes of operation of a TRIAC with appropriate layers.
11. With neat figures and waveforms discuss the operation of a three phase full wave rectifier with RLE load.

OR

12. A half controlled bridge rectifier is fed a load with a ripple free current. At $\alpha = 60^\circ$, the input voltage is 240V, 50 Hz and the load resistance is 10Ω . Calculate the average load voltage, rms load current, average power dissipated in the load.
13. Explain Dual converter with and without circulating current scheme.

OR

14. Discuss a voltage commutated chopper circuit and explaining its various modes of operation with neat figures.
15. A single phase full bridge inverter with an RL load of $R=20 \Omega$ and $L=10 \text{ mH}$, produces a square wave. It is fed from a 120V dc input. Find the rms load voltage, first fundamental rms and total harmonic distortion.

OR

16. Explain the 180 degree conduction method of a three phase inverter and draw the phase voltage waveforms.
17. Explain the operation of a three phase voltage controller with RL load.

OR

18. A single phase full wave voltage controller feeds power to a resistive load of 100Ω from a 230V, 50 Hz supply. Calculate the rms output voltage, input power factor, and half cycle average current at delay angles $\alpha_1 = \alpha_2 = \pi/2$ of both thyristors.
19. Explain the various control strategies of matrix converters.

OR

20. Explain the working of three phase PWM rectifier.