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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

V SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: EE305

Course Name: POWER ELECTRONICS

Max. Marks: 100 Duration: 3 Hours

Graph sheet may be supplied on demand

PART A

Answer all questions, each carries5 marks. Marks

1. Draw static characteristics of SCR, and based on that explain different modes of operation of SCR. (5)
2. With the help of circuit diagram and waveform explain the operation of UJT triggering circuit for one thyristor. (5)
3. Draw the circuit and derive the expression for output voltage of a single phase bridge converter. (5)
4. Differentiate between voltage source inverter and current source inverter. (5)
5. With the help of waveform explain sinusoidal pulse width modulation used in single phase inverter. (5)
6. Derive the equation for power factor for a single phase ac voltage controller feeding a resistive load. (5)
7. Explain the necessity of filter in chopper circuit. (5)
8. Describe the working of type B chopper. (5)

PART B

Answer any twofull questions, each carries10 marks.

9 a) Explain with figures the switching characteristics of SCR during turn on and turn off. (5)

b) With help of detailed structure explain the operation of MOSFET. (5)

10 a) With the help of circuit diagram and waveform explain the operation of RC triggering circuits for one SCR and also draw the voltage across the SCR. (5)

b) Differentiate between features of UJT firing circuit, RC triggering circuit and R triggering circuit. (5)

11 a) Mention the important ratings of the thyristors along with their significance. (5)

b) A battery is charged through a single phase half wave controlled converter. The supply voltage is 230 V, 50 Hz and battery emf is constant at 160 V. Find the value of average charging current for firing angle of 30 degrees. Internal resistance of battery is 2 Ω. (5)

PART C

Answer any twofull questions, each carries10 marks.

12 a) With the help of circuit diagram explain the working of three phase semi controlled converter. (5)

b) Sketch the waveform of input voltage, output voltage and output current of the three phase fully controlled converter with R load with $\alpha = 0^{\circ}$ (5)

13 a) Describe the working of a three phase voltage source inverter with an appropriate circuit diagram. (5)

b) Draw the phase and line voltage waveform of the three phase voltage source inverter with star connected resistive load on the assumption that each IGBT conducts for 120°. (5)

14 a) A single phase bridge inverter fed from 200 V dc, is connected to an RL load of $R = 9\ \Omega$ and $L = 0.04$ H. Determine the power delivered to the load in case the inverter is operating at 50 Hz with square wave output. (5)

b) With the help of circuit diagram explain the working of single phase dual converter with circulating current mode. (5)

PART D

Answer any twofull questions, each carries 10 marks.

15 a) Explain different methods for controlling the voltage at the output terminals of an inverter. (5)

b) With the help of circuit diagram explain the working of single phase ac voltage controller with R load. (5)

16 a) Explain the sinusoidal pulse width modulation used in single phase inverter and draw its waveform. (5)

b) Draw the circuit of buck boost converter and explain its working. (5)

17 a) Explain different types of chopper. (5)

b) A step up chopper has input voltage of 220V and output voltage of 400 V. If the conducting time of the switch is 100 μs, Compute the pulse width of output voltage. (5)

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