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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 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 Sketch the static VI characteristics of SCR and define latching current and holding current. (5)

2 Describe briefly the RC triggering circuit for SCR with a neat circuit diagram. With the help of a graph explain how firing angle control up to 180 degrees is obtained. (5)

3 Explain the operation of three-phase dual converter with circulating current.. (5)

4 Sketch the diagram and output voltage waveform of a single phase half bridge Voltage Source Inverter with R load and describe the working. (5)

5 Define modulation index and Frequency modulation ratio. (5)

6 What are the control strategies for the regulation of output voltage in AC Voltage Controllers? (5)

7 Explain the different methods by which control of output voltage is obtained in Choppers. (5)

8 Derive the expression for the voltage gain in a Boost regulator. (5)

PART B

Answer any two full questions, each carries10 marks.

9 a) Compare the characteristic features of MOSFET AND IGBT (4)

b) Give the structure and operation of TRIAC. (6)

10 a) Describe a single phase half controlled converter with RL load along with necessary circuit diagram and waveforms. (4)

b) With neat circuit diagram explain the operation of a Single Phase Half Wave Rectifier with R, load. Sketch the shape of output voltage waveform. (6)

11 a) Explain how di/dt and dv/dt protection is accomplished in SCR. (4)

b) A fully controlled full wave converter has a source of 240 V rms, 50 Hz and 10 Ω, 50mH, 50V Emf opposing series load. The delay angle is 45°. Determine (6)

a) Average output voltage and current.

b) Rms load voltage and Rms voltage across the RL part of the load.

c) The power absorbed by the 50V load back emf.

PART C

Answer any twofull questions, each carries10 marks.

12 Sketch the circuit diagram and explain the working of a 3 phase full wave controlled rectifier with RLE load. Draw the output voltage waveforms corresponding to $\alpha = 60^\circ$, $\alpha = 90^\circ$ and $\alpha = 150^\circ$ (10)

13 Draw the circuit and explain the 180° operation of a 3 phase bridge inverter with R load. Draw the phase voltage and line voltage waveforms. (10)

14 a) With necessary waveforms explain the working and four quadrant operation of a single phase circulating current type Dual converter. (5)

b) Differentiate a Current source inverter from a Voltage source Inverter. (5)

PART D

Answer any twofull questions, each carries 10 marks.

15 Explain with relevant waveforms a Single phase AC voltage controller with RL load. (10)

16 How four-quadrant operation is achieved in a Type E Chopper? Explain with neat circuit diagram. (10)

17 a) What is meant by Pulse Width Modulation? Describe the various PWM techniques used in Voltage control of Inverters. (5)

b) Explain Sequence control with R load. (5)

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