

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: AE312
Course Name: POWER ELECTRONICS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Explain the constructional details and working of IGBT. Compare Power MOSFET and IGBT. (8)
- b) Explain triggering modes of TRIAC with suitable figures. (7)
- 2 a) Explain switching characteristics of Power BJT with suitable sketches for voltage and current. (7)
- b) Explain the operating principle of single phase half wave controlled rectifier feeding RL load. Explain different techniques to improve power factor of supply. (8)
- 3 a) Describe the working of Three phase to Single phase Cycloconverter with circuit diagram and relevant waveforms. (6)
- b) Explain the principle of operation of single phase ac voltage controller feeding RL load. Draw the necessary wave forms. Derive the expressions for average and RMS output voltage. (9)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Explain the working principle of Class C chopper with equivalent circuit indicating its operation in various quadrants. (7)
- b) For a step down chopper, express the following variables as functions of E_{dc} , R and duty cycle α . (8)
 - i) Average output voltage and current
 - ii) Output current at the instant of commutation
 - iii) Average and RMS freewheeling diode currents

- iv) RMS and average load current
- 5 a) With neat circuit diagram and waveforms explain the working of Current Source Inverter. (7)
- b) Explain the principle of operation of Mc Murray Bedford half bridge inverter with circuit diagram and waveforms. (8)
- 6 a) With an appropriate power diagram discuss the principle of working of 3 phase bridge inverter. Draw phase and line voltage waveforms on the assumption that each MOSFET conducts for 120° and the resistive load is star connected. (8)
- b) What is pulse width modulation? List various PWM techniques. How do they differ from each other (7)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) With circuit diagram, waveforms and output voltage equation explain the operation of buck boost converter. (10)
- b) Draw and explain driver circuits for IGBT. (5)
- c) Explain Flyback SMPS with circuit diagram and waveforms. (5)
- 8 a) Explain different types of UPS using block diagram. (8)
- b) Explain how microcontrollers are used in the control of power electronic circuits. (7)
- c) Draw and explain resonant converters (5)
- 9 a) Explain different types of isolation circuits used in power electronic circuits. (8)
- b) Explain the operation of buck regulator with circuit diagram. (7)
- c) Explain any one of the synchronization circuit used in power electronic circuits. (5)
