T.E (E) VI Rev
Power Electronics 13/6/17

Con. 3356-07. ND-1954

(REVISED COURSE)

(3 Hours) [Total Marks : 100

N.B. (1) Question No. 1 is **compulsory**.
(2) Answer any **four** questions from remaining **six** questions.
(3) Assume additional **suitable data** wherever **required**.

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1. Answer any **four** :— 20
   (a) Draw and explain Gate characteristics of SCR.
   (b) Explain the triggering methods for an SCR
   (c) Compare properties of power BJT, power MOSFET and IGBT on application point of view.
   (d) Explain with neat diagram working principle of an inverter.
   (e) Explain how SCR is suitable than BJT, with suitable example.

2. (a) Sketch I-V characteristics of typical TRIAC. Explain it's four quadrant operation. 10
   (b) Explain the buck regulator with help of circuit diagram and its waveform. Also derive the equation of output voltage. 10

3. (a) Draw and explain the circuit diagram for the synchronized UJT triggering with associate voltage waveform. Explain the necessity of synchronization. 10
   (b) Explain the different methods to achieve harmonic reduction in three phase inverters. 10

4. (a) Draw circuit diagram of Parallel inverter driving highly inductive load. Explain its feedback mode of operation. 10
   (b) Explain constructional features and working principle of IGBT. Give applications of IGBT. 10

5. (a) Draw a neat circuit diagram of one quadrant controlled bridge rectifier and explain its working. Draw the waveforms for— 10
      (i) Supply voltage
      (ii) Load current
      (iii) Load voltage for $\alpha = 45°$
      (iv) Source current.

      consider contineous load current.
   (b) Explain the importance of isolation in gate drive circuits. 10

6. (a) Single phase full-bridge inverter has a resistive load R = 3 Ω and the d.c. input voltage E_{dc} = 50 V. 10
      Calculate :
      (i) the RMS output voltage at the fundamental frequency
      (ii) the output power (p_0)
      (iii) Average and peak currents of each thyristor
      (iv) Peak reverse-blocking voltage of each thyristor.
   (b) Draw the circuit for 1 ϕ AC regulator and explain its operation with appropriate waveforms. 10

7. (a) Draw the circuit diagram of Jone's chopper and explain its working in details with relevant waveforms. 12
   (b) Compare Morgen chopper with Jone's chopper 5
   (c) Give and explain in short any two applications of chopper circuit. 3