

Total No. of Questions : 10]

SEAT No. :

**P3369**

[Total No. of Pages : 3

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**TE. (Electrical)**

**POWER ELECTRONICS**

**(2015 Pattern)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to candidates:*

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10*
- 2) *Assume suitable data, if necessary.*
- 3) *Neat diagrams must be drawn wherever necessary..*
- 4) *Figures to the right indicate full marks.*

**Q1) a)** Explain the triggering of SCR using UJT relaxation oscillator. **[5]**

**b)** Draw neat circuit diagram and explain working of single phase fully controlled bridge converter feeding RL load with freewheeling diode. **[5]**

OR

**Q2) a)** Draw the circuit symbol and VI characteristics of GTO **[4]**

**b)** Draw neat circuit diagram of a 1 phase semi controlled converter feeding R-L load at  $\alpha = 90^\circ$ . Draw output voltage waveform showing devices conducting during one cycle of input ac voltage **[6]**

**Q3) a)** Describe the principle of step up chopper. Derive an expression for the average output voltage in terms of input voltage and duty cycle. State the assumptions made. **[6]**

**b)** Compare between MOSFET and BJT. **[4]**

OR

**Q4) a)** A step up chopper with a pulse width of 100  $\mu$ s is operating from 230 V DC Supply. Compute the average value of load voltage for a chopping frequency of 2000 Hz. **[4]**

**P.T.O.**

- b) For a single phase fully controlled bridge converter with R load
- i) Draw circuit diagram [2]
  - ii) Draw output voltage waveform at firing angle  $60^\circ$  [3]
  - iii) Write formula for average DC voltage [1]

- Q5) a)** For a 3 phase fully controlled bridge converter feeding resistive load
- i) Draw neat circuit diagram [2]
  - ii) Draw output voltage and current waveforms at  $\alpha = 30^\circ$  [4]
  - iii) Write the switching sequence of SCRS clearly [2]
  - iv) Derive expression for average output voltage [2]
- b) Explain triggering of TRIAC using DIAC with neat circuit diagram [6]

OR

- Q6) a)** For a 3 phase fully controlled bridge converter feeding RL load
- i) Draw neat circuit diagram [2]
  - ii) Draw output voltage waveform at  $\alpha=90^\circ$  [4]
  - iii) Write the switching sequence of SCRS clearly [2]
- b) Explain working of single phase AC voltage regulator with R Load . Draw output voltage and current waveforms. [8]

- Q7) a)** Explain with neat circuit diagram and waveforms single phase full bridge voltage source inverter with R load. [8]
- b) Compare Current Source Inverter and Voltage Source Inverter. [8]

OR

- Q8) a)** Explain sinusoidal pulse PWM technique with waveforms [8]
- b) Explain working of Current source inverter with ideal switches [8]

**Q9) a)** Explain working of three phase inverter in  $180^\circ$  mode of operation. For star connected load, draw output line and phase voltage waveforms. Show devices conducting in each step. [10]

b) Draw neat diagram for Diode Clamped multilevel converter and explain its working with the help of Switching states of devices. Draw Output Phase voltage waveform. [8]

OR

**Q10)a)** State the methods for voltage control of inverters and explain any one method in detail. [8]

b) Draw circuit diagram for three level Flying capacitor Converter and explain its principal of operation. Comment on voltage balancing of capacitors. [10]

