

Roll No.

Total No. of Questions : 09]

[Total No. of Pages : 02

Paper ID [EE309]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 5th)

POWER ELECTRONICS (EE - 309)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A

Q1)

(10 x 2 = 20)

- a) Turn ON of a thyristor takes place when _____ current pulse is at the gate.
- b) Turn OFF time of a thyristor affects its _____ frequency.
- c) The di/dt capability of a thyristor increases when the _____ current increases.
- d) Peak inverse rating of a TRIAC is _____ and very much _____ of a thyristor.
- e) A Gate Turn OFF thyristor can be turned OFF by a _____ current pulse at the gate.
- f) Commutation overlap in the phase controlled line commutated converter is due to _____.
- g) A free wheeling diode in a phase controlled converter causes smoothing of _____.
- h) The ripple content of load current of converter feeding RL load is decided by _____ and _____.

- i) A phase controlled cycloconverter employs _____.
- j) A cycloconverter is effectively a combination of two _____ connected in _____.

Section - B

(4 x 5 = 20)

- Q2) Discuss V-I characteristics of a thyristor. What is the effect of gate current on this characteristic?
- Q3) How a thyristor can be protected against di/dt and dv/dt ?
- Q4) Draw the circuit diagram of a uni-junction relaxation oscillator.
- Q5) What are the design considerations for a snubber network?
- Q6) What is a TRIAC? Draw a TRIAC phase controlled circuit and explain its principle of operation.

Section - C

(2 x 10 = 20)

- Q7) What is the principle of resonant pulse commutation? Explain resonant pulse commutation with the help of suitable waveforms.
- Q8) Draw the circuit diagram of a cycloconverter and explain its principle of operation with the help of suitable waveforms.
- Q9) A single phase full bridge inverter controls the power in the resistive load. The nominal value of input DC voltage is $V_s = 220V$ and a uniform pulse width modulation with five pulses per half-cycle is used. For the required control, the width of each pulse is 30° .
- (a) Determine the RMS voltage of the load.
- (b) If the DC supply increases by 10%, determine the pulse width to maintain the same load power. If the maximum possible pulse width is 35° , determine the minimum allowable limit of the DC input source.