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Total No. of Questions : 09] [Total No. of Pages : 02

B.Tech. (Sem. - 5th)
POWER ELECTRONICS
SUBJECT CODE : EE - 309
Paper ID : [A0417]

[Note : Please fill subject code and paper ID on OMR]

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) What is PUT? Give its applications.

b) Differentiate between holding and latching current in a thyristor.

c) What is the role of dv/dt in the operation of a thyristor?

d) What is a triac? Mention its applications.

e) Mention drawbacks of series inverter.

f) What is duty cycle of a chopper?

g) What is a saturable reactor?

h) Why is the output wave in a cycloconverter not sinusoidal?

i) How can the output voltage of a cycloconverter be varied?

j) What is the function of free wheeling diode?

Section - B

(4 x 5 = 20)

Q2) Explain the V-I Characteristics of Thyristors by elaborating the following:

(a) latching current.
(b) holding current.
(c) on-state and off-state condition.
(d) turn-on and turn-off times.
(e) finger voltage.

Q3) Draw circuits and explain any two method of forced commutation of thyristors.

Q4) Explain the operation of a single phase half wave converter for R-load with neat circuit diagram and necessary waveforms.

Q5) Explain the operation of DC Morgan's Chopper for resistive load with neat circuit diagram and output voltage and current waveforms.

Q6) Draw and explain the simple SCR series inverter circuit employing class A type commutation. With the help of important waveforms. State the limitations of this inverter.

Section - C

(2 x 10 = 20)

Q7) (a) Explain the necessity of series and parallel connection of SCRs. Discuss the problems arising in series and parallel connections.

(b) Explain the operation of three phase half-wave controlled converter with inductive load. Sketch the associated waveforms.

Q8) (a) What is the different pulse width modulation techniques used for inverters? Which of the schemes gives better quality of voltage and current?

(b) A step-up chopper with a pulse width of 150 μs operating on 220 V, dc supply. Compute the load voltage if the blocking period of the device is 40 μs.

Q9) Write short notes on any two of the following:

(a) Single phase bridge cycloconverter.
(b) Speed control of DC motor drives.
(c) Jones chopper.