

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2066)

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B. Tech 4th Semester Examination

Power Electronics (NS)

EE-222

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one question from each section A, B, C and D. Section E is Compulsory.

SECTION - A

1. (a) Describe the construction and operation of GTO. (10)
(b) Explain the turn on and turn off characteristics of SCR. (10)
2. (a) Explain various commutation techniques used in a thyristor. (10)
(b) Give a comparison between BJT and MOSFET. (10)

SECTION - B

3. (a) A single phase ac Voltage regulator comprising a thyristor and a diode supplies a purely resistive load of 10 ohms from 230V, 50Hz supply. Calculate.
 - (i) r.m.s value of load voltage
 - (ii) input power factor
 - (iii) r.m.s and average value of thyristor and diode current. (10)

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- (b) Explain the operation of a single phase ac voltage regulator with inductive load. Derive the expression for r.m.s output Voltage. (10)
4. (a) Explain the operation of a 3-phase full convertor with relevant waveforms. (10)
(b) Explain the effect of source inductance on the output voltage of convertor. (10)

SECTION - C

5. (a) Explain the principle of operation of a single phase bridge inverter with R-L load. (10)
(b) Explain the principle of operation and working of a parallel inverter. (10)
6. (a) Explain the operation of a 3-phase Voltage source inverter in 120° conduction mode with star connected resistive load at its output terminals. Draw phase and line Voltages waveform across the load. (14)
(b) Explain sinusoidal PWM technique in inverter. (6)

SECTION - D

7. (a) Explain the current commutated chopper with relevant waveforms. (10)
(b) A step up chopper has a supply voltage of 250V while output voltage is 500V. If period of chopper be 100 microseconds, determine the pulse width of output voltage. If pulse width is reduced to one third for constant frequency operation. Find output Voltage. (10)
8. (a) Explain the operation of a 3- phase cycloconverter with relevant waveforms. (10)
(b) Enumerate the applications of cycloconverter. (10)

SECTION - E

9. (a) Why is $\frac{di}{dt}$ limited for a thyristor?
- (b) What is a snubber circuit?
- (c) What property of thyristor makes it possible to have inversion?
- (d) What are the functions of a freewheeling diode?
- (e) What are the reasons for the low power factor of cycloconverter ?
- (f) What is ON- OFF control in an ac voltage regulator? What are its advantages?
- (g) Why does the commutation capacitor gets overcharged in a chopper?
- (h) State the applications of dc chopper.
- (i) Explain the principle of series resonant inverter.
- (j) What are the functions of a feedback diode? (2×10=20)