

[Total No. of Questions - 9] [Total No. of Printed Pages - 2]

Dec-24-0319 (CBCS)

EE-302 (Power Electronics-I)

B.Tech. 3rd

Time : 3 Hours

Max. Marks : 60

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 each from section A, B, C & D. Section E is compulsory.

SECTION - A

1. Explain the construction and switching characteristics of power MOSFET. (10)
2. (a) Two thyristors are connected in series. Each thyristor has a rating of 4kV and maximum leakage current difference of 10mA. Calculate the value of each resistance of static equalisation circuit. String efficiency = 82.5%. (5)
- (b) What is Thyristor Commutation? Explain Forced Commutation technique, in detail, and with requisite waveforms. (5)

SECTION - B

3. Explain the operation of a fully controlled bridge converter and also, derive the expressions for the average load voltage and input power factor. (10)
4. Describe the working of four quadrant converter with all modes of operation. Also, derive its output waveforms. (10)

SECTION - C

5. What is cyclo-converter? Explain the working of operation of 3-phase to single-phase cyclo-converter with relevant circuit and output voltage equation. (10)

6. (a) What is difference between circulating current mode and non-circulating mode cyclo-converter? (5)
- (b) Describe the working operation of step-down cyclo-converter. (5)

SECTION - D

7. (a) Discuss various output voltage control techniques in choppers. (5)
- (b) Discuss the operation of Class-A and Class -B choppers. (5)
8. Discuss the circuit configuration of voltage commutated chopper. Also, derive the output voltage equation and relevant waveforms. (10)

SECTION - E (Compulsory)

9. Explain the following:
- (i) How can a thyristor be turned off?
 - (ii) What are power transistors?
 - (iii) What is a Snubber Circuit?
 - (iv) What is Commutation angle or overlap angle?
 - (v) What is Full and Semi converters?
 - (vi) What do you understand by Phase Control?
 - (vii) What are advantages of twelve-pulse converters?
 - (viii) What is Circulating type cyclo-converter?
 - (ix) Deduce the equation of output voltage for step-up chopper.
 - (x) What do you mean by Pulse Width modulation technique used in Chopper operation? (10×2=20)