

Subject code : TEE-603

Roll No. to be filled in your Answer Book

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B.Tech.

Electrical Engineering(EE), VIth
Power Electronics (TEE-603)

PAPER ID-

Time- 3 Hours

Max marks: 100

NOTE:

- i. All questions are compulsory.
- ii. Draw diagrams wherever necessary.
- iii. All questions carry equal marks. .

1. Attempt any **FOUR** parts of the following.

5 X 4

- (A) What is power electronics? State it's advantages and applications.
- (B) Discuss the two transistor model of thyristor & derive an expression for anode current.
- (C) What are the characteristics of ideal power switching device? Comparison between IGBT & MOSFET.
- (D) Discuss the importance di/dt rating during the turn on process of a thyristors.
- (E) RLC in an SCR circuit meant for protection are having values $4\Omega, 6\mu H, 6\mu F$ respectively. If the supply voltage to the circuit is 300V, calculate permissible values of dv/dt and di/dt.
- (F) SCRs with a rating of 1000V and 200A are available to be used in a string to handle 6 kV and 1 kA. Calculate the number of series and parallel units required in case derating factor is (i) 0.1 & (ii) 0.2.

2. Attempt any **FOUR** parts of the following

5 X 4=20

- (A) Describe class A & class E commutation for thyristor.
- (B) Explain class C Chopper?
- (C) Give the working of step down chopper & derive expression for o/p voltage.
- (D) Explain Power MOSFET and Power BJT?

- (E) What is a dc chopper? Describe the working of type B chopper. Does it operate as a step down or step up chopper? Explain.
- (F) For Type-A chopper, DC source voltage $V_s=230V$, load resistance $R_L=100\Omega$. For a duty cycle of 0.5, calculate (i) Average and rms values of output voltage
(ii) Chopper efficiency.

3. Attempt any **TWO** parts of the following 10X2=20

- (A) If a freewheeling diode is connected across the output terminals of a three phase fully controlled converter then the performance of converter will be similar to a half controlled converter, why? And justify your answer.
- (B) For single-phase half wave controlled rectifier system, for (i) RL load and (ii) RL load with freewheeling diode across RL.
- (C) What are the dual converters? Explain the operation of single phase dual converters using circulating current mode of operation?

4. Attempt any **TWO** parts of the following 10X2=20

- (A) Describe the working principle of single phase to single phase step down Cyclo-converter with the help of midpoint and bridge type configuration?
- (B) Explain Principle of on-off and phase controls?
- (C) What is a load commutated cycloconverter ? How does it differ from force commutated and line commutated cycloconverters ?

5. Attempt any **TWO** parts of the following 10 X 2

- (A) A three phase bridge inverter delivers power to a resistive load from a 230V DC source. For a star connected load of 5Ω per phase and for 180 degree mode of conduction, determine:
 - (i) rms value of load current
 - (ii) rms value of Thyristor current
 - (iii) Load power
- (B) Explain operation of three phase 120degree mode Voltage source inverter.
- (C) Explain three phase current source inverters?
