

- (iv) The thyristor turn-off requires that the anode current
- (a) falls below the holding current
 - (b) falls below the latching current
 - (c) rises above the holding current
 - (d) rises above the latching current
- (v) A thyristor can be brought from the forward conduction mode to forward blocking mode by ____.
- (a) the dv/dt triggering method
 - (b) applying a negative gate signal
 - (c) applying a positive gate signal
 - (d) applying a reverse voltage across anode-cathode terminals
- (vi) The forward dv/dt rating of an SCR
- (a) increases with increase in the junction temperature
 - (b) decreases with increase in the junction temperature
 - (c) increases with decrease in the rms value of forward anode-cathode voltage
 - (d) decreases with decrease in the rms value of forward anode-cathode voltage
- (vii) The dv/dt protection is provided in order to
- (a) limit the power loss
 - (b) reduce the junction temperature
 - (c) avoid accidental turn-on of the device
 - (d) avoiding sudden large voltage across the load
- (viii) SCRs are connected in parallel to fulfill the _____ demand
- (a) high voltage
 - (b) high current
 - (c) size
 - (d) efficiency

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- (ix) The load voltage of a chopper can be controlled by varying the
- (a) duty cycle (b) firing angle
(c) reactor position (d) extinction angle
- (x) The average output voltage is maximum when SCR is triggered at $\omega t =$
- (a) π (b) 0
(c) $\pi/2$ (d) $\pi/4$

2. (a) Explain the on state switching characteristics of an SCR. (5)
- (b) For an SCR, gate – cathode characteristics has a straight line slope of 130. For trigger source voltage of 15V and allowable gate power dissipation of 0.5 watts, compute the gate source resistance (4)
- (c) What is triggering? Explain the most reliable triggering technique in detail. (6)
3. (a) SCR with a rating 1000V and 200A are available to be used in a string to handle 6KV and 1KA. Calculate the number of series and parallel units required in case of derating factor is 0.1. (4)
- (b) Derive the expression for average voltage of a three – phase half wave controlled converter with resistive load. (6)
- (c) A single phase half wave converter has a purely resistive load R with delay angle of $\pi/3$. Determine : (5)
- (i) E_{dc} and E_{RMS}
(ii) Rectification efficiency
(iii) Form factor
(iv) Ripple factor
(v) Transformer utilization factor (TUF)
4. (a) What are the strategies used to control the average output voltage of chopper? Explain each technique in detail. (5)
- (b) A battery is charged from a constant d.c source of 22V through a chopper. The d.c battery is charged from its internal emf of 90V to 122V. The battery has an internal resistance of 1Ω . For a constant charging current of 10A, calculate the range of duty cycle. (5)
- (c) Explain the operation of a series inverter with the help of circuit and relevant wave diagram. (5)

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5. (a) Explain the operation of multistage sequence control of A.C regulator. (5)
- (b) Two SCRs connected back to back have a load resistance of $400\ \Omega$ and supply of 110V. If the firing angle is 60° , find RMS output voltage and average power. (5)
- (c) What is dielectric heating? Derive an expression for it. (5)
6. (a) Describe the operation of 120 degree conduction scheme of 3-phase inverter. Also draw the necessary waveforms. (8)
- (b) Differentiate between line commutation and forced commutation. Describe any one of the forced commutation techniques. (7)
7. Write short notes on any three : (3 × 5 = 15)
- (a) Triac
- (b) Cycloconverter
- (c) SMPS
- (d) Jone's Chopper
- (e) Two transistor analogy model of thyristor

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