

SC

[A-78]

No. Of Pages: 3

**SARDAR PATEL UNIVERSITY**

**T.Y.B.Sc. (Electronics & Communication) (Semester - VI) Examination**

**Day & Date Monday, 28/03/2016**

**Time : 2:30 PM to 5:30 PM**

**Subject Code : US06CELC01**

**Subject : Power Electronics**

**Total marks - 70**

*Note : The figure to right indicates full marks*

**Q-1 Choose the correct answers (10)**

1. The trigger voltage for SCR is closest to \_\_\_\_\_.  
(a) 0 (b) 0.7V  
(c) 0.4V (d) Breakover voltage
2. A forward voltage can be applied to an SCR after its \_\_\_\_\_.  
(a) Anode current reduces to zero (b) Gate recovery time  
(c) Reverse recovery time (d) Anode voltage reduces to zero
3. A resistor connected across the gate and cathode of an SCR increases its \_\_\_\_\_.  
(a) Turn off time (b) Holding current  
(c) Noise immunity (d)  $dv/dt$  rating
4. The chopper is basically \_\_\_\_\_.  
(a) ac to dc converter (b) dc to ac converter  
(c) ac to ac converter (d) dc to dc converter
5. The load current waveform for inductive load is \_\_\_\_\_ in nature.  
(a) Linear (b) Exponential  
(c) Rectangular (d) None of above

1

P.T.O

6. The duty cycle is the ratio of \_\_\_\_\_.
- (a)  $T_{ON}/T_{OFF}$  (b)  $T_{OFF}/T_{ON}$   
(c)  $T_{ON}/T$  (d) None of above
7. IGBT & BJT both posses \_\_\_\_
- (a) low on-state power losses (b) high on-state power losses  
(c) Both (a) & (b) (d) None of above
8. The holding current is \_\_\_\_\_.
- (a) Equal to latching current (b) Higher than latching current  
(c) Less than latching current (d) None of above
9. The controlled parameter in IGBT is the
- (a)  $I_C$  (b)  $V_{CE}$   
(c)  $V_{GE}$  (d) None of above
10. The major drawback of the first generation IGBTs was that, they had
- (a) latch-up & secondary breakdown problems (b) sluggish operation  
(c) noise & secondary breakdown problems (d) latch-up problems

Q-2 Attempt Any Ten out of following

(20)

- I. Discuss regenerative braking of the motor.
- II. List out the different types of commutation methods of thyristors.
- III. Compare and Contrast between SCR (Silicon Controlled Rectifier) & TRIAC.
- IV. Define : motoring chopper
- V. Give the difference between step up chopper and step down chopper.
- VI. Why reverse breakdown voltage is greater than the forward breakdown voltage in Silicon controlled rectifier.
- VII. Draw the circuit diagram of Bridge rectifier.
- VIII. What are the chopper configuration using ideal switches?
- IX. Draw the symbolic representation and characteristics for SCR & TRIAC of Semiconductor device and label it.

- X. Differentiate between half wave and full wave uncontrolled rectifier.  
XI. What do you mean by freewheeling of diode?  
XII. Draw a neat circuit diagram of a Type – E chopper.

Q-3 Discuss the Principle, Construction and working of silicon controlled rectifier (SCR). (10)

OR

Q-3 (a) Why Series connection of SCR is required? Discuss the series operation of SCR in detail. (06)

(b) Explain the phase control of TRIAC using DIAC. (04)

Q-4 What are the constraints on the commutation circuit to ensure a successful commutation? With the help of neat and clean circuit diagram explain the operation of Class A type with it's waveforms. (10)

OR

Q-4 Write a short note on followings:

- Class B (10)
- Class D

Q-5 Explain the step down Type A chopper with resistive and RL load. (10)

OR

Q-5 (a) Discuss step up chopper in detail. (06)

(b) Write a note on control strategies for chopper. (04)

Q-6 Discuss step down chopper in detail.

OR

Q-6 Explain the following terms for an uncontrolled rectifier circuits (10)

- Form factor
- Ripple factor
- TUF
- Power factor
- Harmonic factor.

X = X = X

3