[43] SEAT No._____ No. of Pages: 02

SARDAR PATEL UNIVERSITY

B.Sc. Sixth semester

Electronics and Communication

US06CELC01

Power Electronics

Monday, 25/03/2019

Time: - 10:00am To 1:00pm **Marks: - 70**

Q.1 Choose the correct answer (Attempt all) **(10)**

1. A 3-phase bridge rectifier, has the average output voltage as 286.48 V. Find the maximum value of line voltage
   (a) 300 V (b) 200 V (c) 100 V (d) None
2. The class A commutation or load commutation is possible in case of
   (a) ac circuits (b) dc circuits (c) both (a) & (b) (d) None
3. In which type of chopper, two stage conversions is taking place?
   (a) AC link (b) DC link (c) AC-DC link (d) None
4. A thyristor (SCR) is a_____.
   (a) PN device (b) PNP device (c) PNPN device (d) None
5. In which type of commutation separate voltage source is used to turn off the SCR?
   (a) Class C (b) Class D (c) Class E (d) Class B
6. In a three-phase half wave diode rectifier using 3 diodes, each diode conducts for_____
   (a) 60 degrees (b) 90 degrees (c) 120 degrees (d)360 degrees
7. How many layers and junction are there in SCR?
   (a) Four layer, three junction. (b) Three layer, three junction.
   (c) Four layer, four junction. (d) None of above.
8. Which device can be used in a chopper circuit?
   (a) BJT (b) MOSFET (c) GTO (d) All of above
9. Which type of conversion is taking place in Choppers?
   (a) ac-ac (b) dc -dc (c) ac-dc (d) dc-ac
10. For SCR latching current is _____ than the holding current.
    (a) higher (b) lower (c) same as (d) None

[20]

Q-2 Answer the following (any ten)

1. Define: Latching current.
2. What is meant by knee point voltage?
3. A 3-phase full converter supplied from a 230 V source is working as a line commutated inverter. The load consists of RLE type with R = 5 Ω, E = 200 V and L = 1 mH. A continues current of 10 A is flowing through the load, find the value of the

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firing angle delay.

4. Differentiate between DIAC and TRIAC.
5. In case of class B commutation or resonant-pulse commutation with L = 5 μH and C = 20 μF with initial voltage across the capacitor (Vs) = 230 V. Find the peak value of resonant current.
6. Note down the advantages of three phase uncontrolled half wave rectifier.
7. List out the application of TRIAC.
8. What is AC line commutation?
9. A 3-phase bridge rectifier charges a 240 V battery. The rectifier is given a 3-phase, 230 V supply. The current limiting resistance in series with the battery is of 8 Ω. Find the average value of battery charging current.
10. Explain the term Phase Voltage.
11. Latching current for an SCR is 100 mA, DC source of 200 V is also connected from the SCR to the L load. Compute the minimum width of the gate pulse required to turn on the device. Take L = 0.2 H.
12. Define : DC Chopper

Q-3 (a) Explain the turn off mechanism of SCRs. [05]
(b) Explain the operation of TRIAC in detail. [05]

OR

Q-3 Explain the principle of operation, construction and working of SCR. [10]

Q-4 (a) Write a short note on Class B commutation technique. [06]
(b) Discuss the Class D commutation method. [04]

OR

Q-4 With necessary circuit diagram discuss in detail Class A commutation method. [10]

Q-5 (a) Explain in detail about the control strategies for choppers. [06]
(b) Explain step down type B chopper with resistive load. [04]

OR

Q-5 With necessary circuit and waveforms, explain in detail step up chopper. [10]

Q-6 What are uncontrolled rectifiers? With suitable circuit diagram discuss in detail about three phase half wave uncontrolled rectifier with necessary circuit diagram. [10]

OR

Q-6 Explain three phase full wave rectifier with necessary circuit diagram and waveforms. [10]

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