

CS/B.Tech/Even/EE/6th Sem/EE-603/2014

load and free wheeling diode (F.D). Discuss also the advantage.

b) Explain the single phase cyclo-converter with necessary waveforms. (8+7)

8. a) Discuss both L-type ZCS resonant converter with the help of suitable waveforms.

b) A 3-phase full wave bridge type inverter (180° VSI) is connected to load. Show that the r.m.s value of output line voltage is given by:

$$V_o = \frac{\sqrt{2}}{\sqrt{3}} V_s \quad (6+9)$$

9. a) Discuss in detail the type-A,B choppers.

b) A three phase bridge inverter delivers power to a resistive load from a 450V DC source. For a star connected load of 10 ohm per phase, determine for both-

(a) 180° mode and (b) 120° mode,

i) rms value of load current

ii) rms value of thyristor current

iii) load power (6+9)

10. a) What is overlap. Explain in detail.

b) A step up chopper has R load with R=20 ohm and $V_s = 220V$. When the converter remains on, its voltage drop is $V_{ch} = 1.5V$ and its chopping frequency is 10KHZ. If the duty cycle is 80%, determine:

i) the average output voltage.

ii) the rms output voltage

iii) the converter efficiency

iv) the effective input resistance

v) the rms value of the fundamental component of harmonics on the output voltage. (6+9)

11. Write short notes on any three of the followings: (3x5)

a) RC triggering of SCR.

b) UJT triggering of SCR

c) SMPS.

d) Static characteristics of SCR.

e) Electronic Ballast

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2014

Power Electronics

Time Alloted : 3 Hours

Full Marks : 70

The figure in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any ten of the following questions. 10x1=10

i) Which of the following is not a current triggered device?

(a) Thyristor

(b) GTO

(c) Triac

(d) MOSFET

ii) Which of the following does not cause permanent damage of an SCR?

(a) high current

(b) high rate of rise of current

(c) High temperature rise

(d) high rate of rise of voltage

iii) The on state voltage drop of an SCR is

(a) 0.7V

(b) 1.2V

(c) 2.3V

(d) >3V

iv) The ripple current of load current of a converter feeding RL load is decided by

(a) Load resistance alone

(b) Load inductance alone

(c) Both (a) & (b)

(d) Neither resistance nor inductance

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- v) In a single phase full converter if output voltage has peak and average values of 325V and 133V respectively then the firing angle is
 (a) 40 deg (b) 140 deg
 (c) 50 deg (d) 130 deg
- vi) A 6-pulse bridge converted feeds a pure resistive load. The control of the converter can be varied in the range
 (a) $0^\circ \leq \alpha \leq 180^\circ$ (b) $0^\circ \leq \alpha \leq 120^\circ$
 (c) $0^\circ \leq \alpha \leq 150^\circ$ (d) $30^\circ \leq \alpha \leq 150^\circ$
- vii) The maximum firing angle that can be obtained by a pure resistive trigger circuit used in phase control circuit is
 (a) 45° (b) 90°
 (c) 135° (d) 180°
- viii) A two pulse converter supplies RLE load with $R=5$, $L=20H$, $E=160V$ from a 220V, 50 Hz supply. Load draws an average current 10 of 7.614A. If the value of E is changed to 155V, the new 10 will be-
 (a) 7.914A (b) 8.614
 (c) 7.214A (d) 8.414A
- ix) A PWM switching scheme is used in 1-phase inverters to-
 (a) reduce total harmonic distortion with modest filtering
 (b) minimize the load on the dc side
 (c) increase the life of batteries
 (d) reduce the low order harmonics and increase the higher order harmonics.
- x) Resonant converters are basically used to
 (a) Generate large peak voltages
 (b) reduce switching losses
 (c) eliminate harmonics
 (d) convert a square wave into a sine wave.
- xi) If gate current of SCR is incresed, then forward break over voltage will be

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- (a) increased
 (b) decreased
 (c) remain same
 (d) reduced to zero
- i) An UJT exhibits negative resistance region
 (a) before the peak point
 (b) between peak and valley point
 (c) after the valley point
 (d) both (a) and (c)

GROUP - B

(Short Answer Type Questions)

Answer any three of the following.

3x5=15

Describe the different modes of operation using static V-I characteristics of Thyristor. What is the effect of gate current on this characteristic? (4+1)

What is the necessity of connecting SCRs in series? What are the problems associated with series connection of SCRs? How are they eliminated? (2+2+1)

Draw and explain circuit diagram for the synchronized UJT triggering. Also draw the associated voltage waveforms. (4+1)

With a neat circuit diagram and waveform explain the operation of three phase half controlled bridge with RL load. (5)

What is PWM inverter? What is the advantage of PWM inverter over VSI? (2+3)

GROUP - C

(Long Answer Type Questions)

Answer any three of the following.

3x15=45

- a) Explain with the necessary waveforms the principle of operation of 1-phase H.W phase controlled converter with RLE