

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY: KURNOOL**III B.Tech / I Sem - EEE – Mid Term – II Examination****Sub: Power Electronics****Date: 11 /11/2016****Time: 90min****Max.Marks:30**

Answer the following questions, FIRST question is compulsory:

Part -A

1. Write the short notes for the following terms:
- Differences between voltage converters and voltage controllers
 - Duty ratio of the chopper
 - VSI and CSI inverters

Part - B

2. Derive the average output voltage, load current expressions for six pulse converter for R-L-E Load with neat diagrams?
- (OR)**
3. Explain the operation of a three phase half-wave rectifier with R-load with suitable waveforms? And also derive the average output voltage and current equations?
4. Explain in detail the steady-state time domain analysis of type- A chopper ?
- (OR)**
5. For type-A chopper, dc source voltage=230 V, load resistance=10 Ω . Take a voltage drop of 2 V across chopper when it is on. For a duty cycle of 0.4, calculate
(i) Average and rms values of output voltage. (ii) Chopper efficiency.
6. State the various methods of voltage control in inverter circuits and explain each of them Briefly?
- (OR)**
7. Explain the operation of 1-phase full bridge inverter with R-L load?

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Part -A

1. Describe the following terms:
 - (a) Load commutation of Chopper circuit?
 - (b) Differences between 120degrees and 180 degrees conduction mode?
 - (c) Differences between 3-pulse and 6-pulse converters?

Part -B

2. Draw the circuit diagram of a three phase half controlled converter with RL load and obtain an expression for the average load voltage across the load?

(OR)

3. Explain the operation of single phase A.C. Voltage controller with a neat circuit diagram and output waveforms for RL load for any firing angle α ?

4. Explain the operation of step-up chopper with a neat circuit diagram and necessary output waveforms and also derive expressions for output voltage ?

(OR)

5. For an ideal type-A chopper circuit, following conditions are given $V_s = 220V$, chopping frequency = 500Hz, duty cycle $\delta = 0.3$, $R = 1 \text{ ohm}$, $L = 3\text{mh}$, and $E = 23V$. Compute the following quantities.

- (a) Check whether the load current is continuous or not.
- (b) Average output current.
- (c) Maximum and minimum values of steady state output current.

6. 1-phase half bridge inverter has resistance load of $R=3 \text{ ohms}$ and D.C input voltage $V_s = 50V$ calculate : (a) R.M.S output voltage at fundamental frequency.

- (b) The output power. (c) Average and peak current of each thyristor.

(OR)

7. Explain the operation of Series Inverter in detail with neat waveforms?

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1. Write the short notes on the following terms:
 - (a) Sinusoidal PWM technique?
 - (b) Differences between series and parallel inverter?
 - (c) Chopping frequency in choppers circuit?

Part -B

2. What are the different pulse width modulation techniques used for inverters?
(OR)
3. Explain the operation of a single phase bridge inverter for RL and RLC loads with the help of Load voltage and current waveforms.
- 4 Explain the principle of operation of a step-down chopper. Also mention different applications of a d.c chopper?
(OR)
5. A dc chopper of input voltage 200 V remains on for 25 msec and off for 10 msec. Determine The average voltage which appears across the load. If the load is assumed to be resistive ($R=10\ \Omega$), then find the RMS value of output voltage and power delivered to the load?
6. Explain the operation of three phase, semi converter with inductive load with the associated Wave forms for continuous conduction?
(OR)
7. A three phase half wave converter is operated from a three-phase star connected 208V, 50Hz Supply and the load resistance is $R=10\ \Omega$. If it is required to obtain an average output voltage of 50% of the maximum possible output voltage, calculate:
 - (i) The delay angle.
 - (ii) The rms and average output currents.
 - (iii) The average and rms thyristor currents and
 - (iv) The rectifier efficiency.

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Answer the following questions, **FIRST** question is compulsory:

Part -A

1. Briefly discuss the following terms:
 - (a) What are the limitations of 3-pulse converter?
 - (b) Advantages of PWM techniques?
 - (c) Differences between forced and load commutation techniques for the choppers?

Part -B

2. Explain the operation of three phase fully controlled bridge converter with RL loads. Describe in detail with discontinuous conduction mode with associated waveforms?

(OR)

3. For a single phase ac voltage controller feeding a resistive load, draw the waveforms of source voltage, gating signals, output voltage, source and output currents and voltage across SCRs. Describe its working with reference to the waveforms drawn?

4. Describe the operation of Type-C chopper and derive the corresponding output voltage and Current equations with neat waveforms?

(OR)

5. Explain the principle of operation of Buck-Boost chopper and evaluate the output voltage and Current equations?

6. Draw and explain the simple SCR parallel inverter circuit employing class A type Commutation With the help of important waveforms and state the limitations of this inverter?

(OR)

7. With the help of neat diagram and associated wave forms, explain the operation of 1- phase Full bridge voltage sourced inverter with:
 - (a) Resistive load
 - b) Inductive load.

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ANSWERS FOR OBJECTIVE QUESTIONS:

- 1.C
- 2.C
- 3.C
- 4.C
- 5.D
- 6.C
- 7.A
- 8.C
- 9.D
- 10.A
- 11.B
- 12.B
- 13.B
- 14.A
- 15.A
- 16.B
- 17.D
- 18.D
- 19.C
- 20.B