

Mr. Mohit Garg

Roll No:.....

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- MAY 2019

B. Tech VI Semester

COURSE CODE: 11B1WEC611

MAX. MARKS: 35

COURSE NAME: Power Electronics

COURSE CREDITS: 4

MAX. TIME: 2 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. Discuss in brief various power semiconductor devices. Mention the characteristics of an ideal switch. [5 marks]
2. An RL load is fed from single-phase supply through a single thyristor. Derive an expression for the load current and draw the waveforms of load voltage, load current.

If the above circuit is energised from single-phase 230 V, 50 Hz source with load parameters $R=10 \Omega$ and $L=0.08 \text{ H}$, and thyristor is triggered in every positive half cycle at firing angle 75° , find the expressions for average output voltage and average output current. [7 marks]

3. Explain the working principle of Buck converter for both continuous and discontinuous load current and derive the expression of the duty cycle for the limit of continuous current conduction.

Given data,

source voltage $V_s = 220 \text{ V}$, chopping frequency $f = 500 \text{ Hz}$, $T_{ON} = 800 \mu\text{s}$,
 $R = 1 \Omega$, $L = 1 \text{ mH}$ and $E = 72 \text{ V}$.

- a) Find whether load current is continuous or not.
 - b) Find the maximum and minimum values of steady state output current. [8 marks]
4. Draw the circuit for a single-phase full-bridge inverter, draw output voltage and current waveforms for purely resistive load. Show that the Fourier series of the output voltage waveform contains only odd harmonics. [6 marks]
 5. Discuss the working of three-phase inverter with delta connected load. Draw the waveforms of all phase-phase voltages and currents. [5 marks]
 6. Discuss the working of a cycloconverter circuit which gives output frequency one-fourth times the input frequency. [4 marks]