

Dr B R Ambedkar National Institute of Technology, Jalandhar
B Tech (Electrical Engineering)
EEPC-305, Power Electronics
End Semester Examination, Dec 2020

Duration: 02 Hours

Max. Marks: 40

Date: 5th Dec 2020

(Marks Distribution & Mapping of Questions with Course Outcomes (COs))								
Question Number	1	2	3	4	5	6	7	8
Marks	5	5	5	5	5	5	5	5
CO No.	1	1	2	4	3	4	3	3
Learning Level	1	2	2	2	3	1	3	1

Note:

1. Attempt all the questions.
2. Write the answers in hard copy (on A4 sheet) using blue/black pen with your signature on top left and page number on top right corner of each page of the answer booklet.
3. The time allowed for writing examination is 02 hours. Extra 15 minutes are allowed for preparing the PDF file of Answer Booklet and submitting it.
4. Follow the instructions regarding submission of answer booklet as issued by the examination section.

- Q 1. Discuss the two transistor model of a thyristor and hence explain the various mechanisms for turning ON a thyristor.
- Q 2. For class D commutation of the thyristor, supply voltage $V_s = 200V$, the value of inductance $L = 0.02mH$ and capacitance $C = 50\mu F$. For a constant load current of 100A, Find
- (a) Peak value of current through capacitance, main thyristor and auxiliary thyristors.
 - (b) Circuit turn OFF time for main and auxiliary thyristors.
- Q 3. A single phase full converter is supplied from 220V, 50Hz source. The load resistance is $R = 10\Omega$ and a large inductance so as to render the load current constant. For a firing angle delay of 45° , Determine
- (a) average output voltage
 - (b) average output current
 - (c) average and rms values of thyristor currents
 - (d) input power factor
- Q 4. A single phase full bridge inverter feed power at 50Hz to RLC load with $R = 5\Omega$, $L = 0.3H$ and $C = 50\mu F$. The DC input voltage is 220V.
- (a) Find an expression of load current up to 5th harmonic.
 - (b) Find the power absorbed by the load and the fundamental power.
 - (c) The rms and peak current of each thyristor.
- Q 5. Consider the step down converter shown in Figure (1). with all components to be ideal. Assume $V_o = 5V$, $f_s = 20KHz$, $L = 1mH$ and $C = 470\mu F$. Calculate
- (a) ΔV_o (peak-peak) if $V_d = 12.6V$ and $I_o = 200mA$.

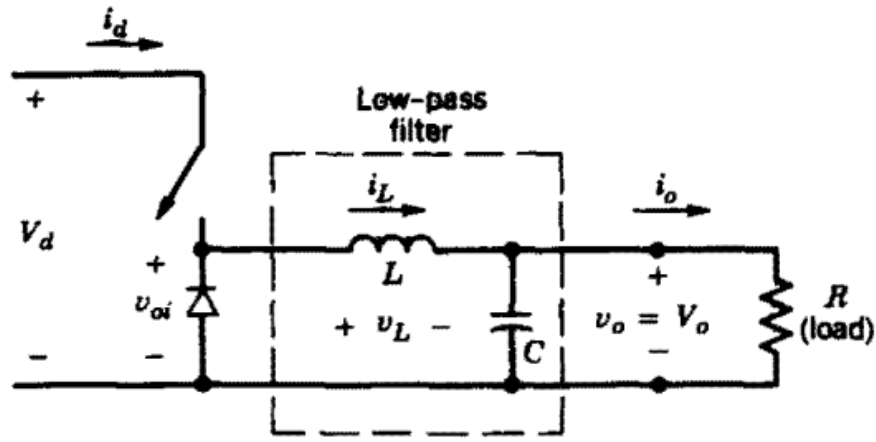


Figure 1:

(b) rms value of ripple current through L and hence through C .

Q 6. Name different types of Pulse Width Modulated inverters. How do they help in harmonic reduction in the output voltage applied to the load.

Q 7. A single-phase full wave ac voltage controller has a load of $R = 5\Omega$ and the input voltage is $230V$, $50Hz$. If load power is $5KW$, find

(a) firing angle delay of thyristors

(b) input power factor.

Q 8. Discuss the working of single-phase to single-phase step down cycloconverter with

(a) Discontinuous load current

(b) Continuous load current
