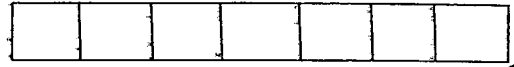


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B.E. / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2013

Electronics and Communication Engineering Branch

SIXTH SEMESTER

EC 511/EC9047 – POWER ELECTRONICS

(REGULATIONS 2004/2008)

Time: 3 Hours

Max. Marks:100

Answer All Questions

Part-A

(10 x 2 = 20 marks)

- 1) What is the function of anti-parallel diodes in MOSFET?
- 2) What is the necessity for connecting power semiconductor devices in series?
- 3) What are the effects of overlap in a fully controlled rectifier?
- 4) Write the practical applications of Dual converters.
- 5) What are the various configurations of resonant power supplies?
- 6) What are the demerits of a linear power supply when compared to SMPS?
- 7) Mention the limitations of series inverters.
- 8) Draw the circuit of a current source inverter and its output waveforms for a star connected load.
- 9) What is meant by relays? Why we use relays in power systems?
- 10) Write short notes about the DC motor drives.

Part-B

(5 x 16 = 80 marks)

- 11) (a) (i) Draw the two-transistor model of a thyristor and explain its operations (8)
 (ii) Explain the effect of adding a free wheeling diode across the output terminals of a full converter on its output voltage (8)

- 12) (a) A single-phase ac voltage controller circuit shown in figure – 1 has a resistive load of $R = 10 \Omega$ and the input voltage is $V_S = 120 \text{ V}$, 60 Hz. The delay angle of thyristor T_1 is $\alpha = \pi / 2$. Determine (a) the rms value of output voltage V_o , (b) the input power factor PF, and (c) the average input current. (16)

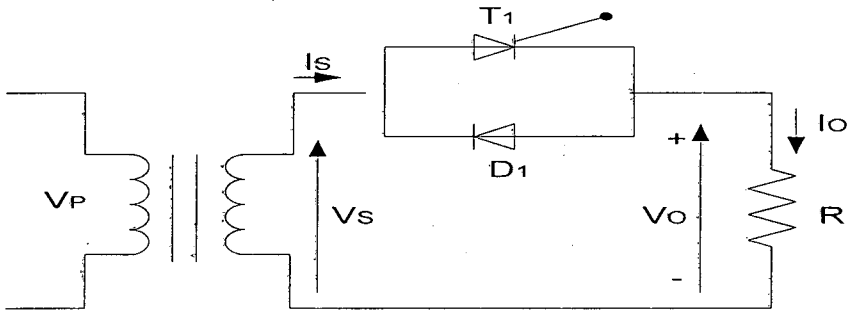


Figure -1

(or)

- (b) Explain in detail about the operation of three phase full converter circuit with neat diagrams and then derive the rms output voltage equation. (16)

- 13) (a) A dc chopper is connected to an inductive load with a resistance of 5Ω and an input voltage of 300V. The on time and off time of the chopper are 20ms and 10ms respectively. Estimate the duty ratio, chopping frequency, average load voltage and average load current. (16)

(or)

- (b) Explain in detail about the Buck type switching-mode regulators operation with neat diagrams; derive the equations for switching period and capacitor voltage. (16)

- 14) (a) Calculate the output frequency of the series inverter with the following parameters:
Inductance $L = 6\text{mH}$, Capacitance $C = 1.2\ \mu\text{F}$ and the load resistance $R = 100\ \Omega$. Take $T_{\text{OFF}} = 0.2\text{ms}$.

i) Find the range of output frequency

a) If the load resistance R is varied from $40\ \Omega$ to $140\ \Omega$

b) If T_{OFF} is varied from 0.1ms to 0.4ms

ii) What is the maximum possible output frequency? (16)

(or)

- (b) With the necessary explanation and equations, write the notes on following items:-

(i) Single pulse-width modulation (8)

(ii) Multiple pulse-width modulation (8)

15. (a) Explain in detail about the Induction motor drives; How it applies in the power systems? (16)

(or)

- (b) Write short notes about the following items:-

(i) Solid state relays (8)

(ii) Micro-electronic relays (8)